L6: Entry 14 of 16 File: USPT Jul 10, 2001

DOCUMENT-IDENTIFIER: US 6259367 B1
TITLE: Lost and found system and method

Abstract Text (1):
The present invention is a system and method for identifying and returning an object includes affixing to the object a passive two-way communication circuit such as a frangible radio security tag or smart label. The tag or label, when operational, is arranged to receive a remotely generated request for status information and, responsive to the request, to transmit status information to a remote device. If desired, the radio tag can be incorporated into a printed label, each label having an adhesive side and a printable side with information to notify the `finder` of a tagged item to coordinate return to its registered owner by contacting a courier, postal or other delivery service network. In the event that a tagged item should become misplaced, the carrier and the supplier can cooperate to locate it and inform the owner of its whereabouts by using the information provided upon enrollment to an electronic `lost and found` network service. In a preferred embodiment, a Web browser program is launched in response to e-mail, and return tracking at the URL of the vendor's Web site is accessed through the Internet.

Brief Summary Text (3):
The present invention relates automated systems and methods for retrieving lost objects.

Brief Summary Text (5):
The use of identification tags and reward offers is the most well known and prevalent method for returning lost objects to their owners. For example, tags may be placed on luggage, cell phones, computer equipment, or any object capable of being lost, and making it possible for the finder to locate the owner to arrange for return and possible reward by the owner to the finder.

Brief Summary Text (7):
The idea of encoding the owner's private information on an identification tag has been proposed by others, but prior methods require registering the encoded information with a third party, and for the finder to return the lost object to the third party who, in turn, returns the lost object to the owner.

Brief Summary Text (8):
Recently Lewis U.S. Pat. No. 5,841,116 has proposed using bar code labels bearing pre-identified insignia corresponding to a unique owner, and a system wherein the labels are placed on the owner's objects and the identifying data is stored on a computer at a central location, and if the object is lost and then found by a third party finder, the ownership can be determined by use of a bar code scanner and transmission of a query based on the scanned identifier to the computer at the central location.

Brief Summary Text (10):
Isaacman et al, U.S. Pat. No. 5,936,527, have proposed a method and apparatus for locating and tracking documents and other objects for office files using radio frequency identification tags on the files for locating tagged documents within shelves and drawers.

09/424,900 - Final

Brief Summary Text (12):
There exists a need for better electronic location systems, particularly systems that can accommodate the tracking of individual personal belongings such as pagers, cellular phones, other handheld computing devices, baggage, eyeglasses, pocketbooks, wallets, keys, smartcards used for authorized access to rooms and buildings, bicycles, motorcycles, and any other object subject to being misplaced.

Brief Summary Text (13):
There also exists a need for systems and methods that would permit automatic lost property identification, as well as permit immediate or real time location and retrieval of objects in diverse environments.

Brief Summary Text (14):
Moreover, simple systems for locating and/or retrieving objects which can be incorporated into a conventional express courier, postal or other commercial data processing or communications infrastructure would likewise enhance efficiency while also achieving a cost economy as a result of integration with existing hardware and/or software.

Brief Summary Text (15):
The present invention comprises in one aspect a system for returning lost objects to their owners comprising RFID tags on which are electronically recorded unique identification codes and visible printed instructions for returning the object, if lost, to a location, an RFID tag reader at the location, a computer which receives the unique identification code read by the RFID tag reader and provides owner information corresponding to the unique identification code.

Brief Summary Text (16):
In another aspect, the invention comprises a method for returning lost objects to their owners comprising providing a radio frequency identification (RFID) tag to the owner for application to the owner's object or supplying the object with the tag preaffixed, the tag having a unique identification code number electronically recorded within the tag and a visible printed request to any finder to return the object if lost to any of a set of specified locations or package delivery services; storing the unique identification code number and corresponding owner information, including owner address information and owner billing account information, in a computer system which is accessible by the set of specified locations and/or package delivery services; providing RFID tag readers at the specified locations and/or package delivery services; upon return of any lost object by the finder to any specified locations and/or package delivery service location, reading the RFID tag identification code number, accessing the corresponding owner information from the computer system, returning the object to the owner, and using the owner's billing account information to charge the owner for the return of the object to the owner.

Brief Summary Text (20):
In particular, the present invention is a method and system for a computer, such as a client computer in a networked computer system, to retrieve a computer file in which a symbol data string comprising a file location pointer is encoded into a radio frequency tag such as an RFID silicon tag, and the radio frequency ID is rendered within a data carrier (e.g. printed on an intelligent document). A computer input device such as a RFID reader device (handheld or fixed) is coupled to the client computer and transposes an input data string from the RFID tag. The computer parses the input data string to determine the file location pointer, and the file location pointer is then utilized pointer to request the computer file designated thereby.

Brief Summary Text (23):
The technical field of this invention is electronic communication systems and, in

particular, systems for locating and/or retrieving objects by radio frequency interrogation of an object displaying a smart tag or label to detect the presence of unique identification information to facilitate its rapid return processing.

Detailed Description Text (5):
RFID have several advantages over bar code labels in that there are no optical considerations and therefore the RFID tags will read through nonmetallic coatings of dirt, dust, paint, etc., without a decrease in performance. RFID eliminates common problems associated with bar code such as ability to change data, and read/write RFID provides the benefit of the ability to change data.

Detailed Description Text (6):
Inductive RFID tags 10 consist of silicon, a coiled, etched, or stamped antenna, a capacitor, a substrate, and may include a protective covering as well as an encapsulating sealant. Recently, thin, planar inductive tags have been introduced by Motorola under the "BiStatix" brand featuring wire, printed silver, etched, or stamped metal antennae on flexible substrates. The reduction from 200 turns of copper wire down to a half dozen turns of wire, printed silver etched or stamped metal coils and the elimination of a hard protective cover has substantially reduced tag cost. Customers today are seeking a better solution than bar code offers, while attempting to minimize the increased cost premium for the functionality provided by RFID. BiStatix works on a capacitive coupling principle. Electric fields are capacitively coupled to and from a reader and tag. As in an inductive system, a BiStatix reader/writer generates an excitation field which serves as both the tag's source of power and its master clock. The tag cyclically modulates its data contents and transmits them to the reader's receiver circuit. The reader demodulates and decodes the data signal and provides a formatted data packet to a host computer for further processing.

Detailed Description Text (7):
Unlike conventional inductive systems, BiStatix provides an elegantly simple and cost effective tag design, suitable for high volume or disposable applications. Capacitive coupling enables the elimination of costly coils, capacitors, lead-frames, low resistance interconnects, and inflexible substrates. BiStatix tags are comprised of a silicon chip attached to printed carbon ink electrodes on the back side of a paper label on which there may be printed instructions such as a request to return the object in the case of this invention.

Detailed Description Text (12):
The intelligent document 10 is disseminated to the end user in accordance with the methods desired by the vendor. The vendor may be the seller of the tag or may be a seller of the object itself, in which case the tag may be affixed to the object before, at, or after it is sold to the owner, and the unique identification number can be pre-programmed. The serve 112 and/or 116 ((FIG. 5) can be updated at the time of sale with the owner's name, address, account information, phone, and the like. The account information can comprise credit card, bank account, package delivery service account information, debit card information, and the like.

Detailed Description Text (13):
When the object is lost, found, and returned to a designated location, a person at the location, after reading the text and graphics in the document, can access the Web site of the vendor by utilizing a Browser program such as NETSCAPE or by connection with a radio frequency-reader device 34 in conjunction with his client computer 32, programmed with appropriate software in accordance with the invention. That is, the user will read the code 12 with radio frequency-reader device. Alternatively, a back-up optical scanner sufficient to scan bar code symbols and the like is disclosed in U.S. Pat. No. 5,448,050, which is incorporated herein by reference, may be used as a back-up reader device. The device disclosed in the '050 patent is housed within a mouse type device, thus also including circuitry useful in point-and-click applications popular in personal computer platforms today.

Detailed Description Text (15):
The above scenario is useful when a vendor prints and distributes such intelligent documents on a mass scale. That is, the symbol 12 distributed is the same for each user. In an alternative embodiment, specific identification information is included with the code to provide for personalized operation as follows. This scenario is useful when the vendor makes individual return shipment labels (i.e., Airbill number) keyed to individual users, such as when preprinted express shipment or courier labels are printed for inclusion on an envelope or box surrounding the located missing object.

Detailed Description Text (32):
Referring now to FIG. 11, RFID tags are programmed with unique identification codes and printed with a standard visible return request and instructions to return the object if found to any specified package delivery service or return location 300. The package delivery service can be a specific brand such as Federal Express, UPS, Airborne Express, US Postal Service, other government postal service, and the like, and a return location can be any location where there is an RFID tag reader. For example a chain of stores such as Radio Shack or Sears may provide RFID readers at each location and may work in conjunction with the provider of RFID tags. In some embodiments the chain of stores may provide the tags on the objects it sells.

Detailed Description Text (33):
Owner information 301 is cross reference to the ID code in a computer system such as a computer server. The owner information can include name, address, contact instructions such as phone, fax, email, or wireless information. The owner information should also include billing account information such as credit card, package delivery service, account numbers, or debit card information. The billing account information will be used later if the object is lost and then returned through the system of the invention.

Detailed Description Text (34):
The RFID tag may be affixed 302 to the object by the owner after the object is purchased or may be pre-affixed by the manufacturer or seller. If the object is lost 303 by the owner and then found 304, the finder is requested by the printed label to return the object to, for example, a package delivery service or a return location such as the aforementioned stores.

Detailed Description Text (35):
Upon receipt of the object at the package deliver service or return location, the RFID tag is read with a RFID reader and the code is sent 305 as a query over, for example a client server computer architecture to a computer system comprising a server. The computer system provides 306 owner address information and charges the owner a return fee using the billing account information. The system may also direct a telephone call or e-mail to the owner and may print address labels or overnight package delivery service labels, or provide other automated features to expedite return of the object to the owner.

CLAIMS:

1. A method for returning lost objects to their owners comprising providing a radio frequency identification (RFID) tag to the owner for application to the owner's object or supplying the object with the tag preaffixed, the tag having a unique identification code number electronically recorded within the tag and a visible printed request to any finder to contact a package delivery service;

storing the unique identification code number and corresponding owner information, including owner address information and owner billing account information, in a computer system which is accessible over the Internet by the package delivery service;

providing RFID tag readers at the package delivery services;

upon return of any lost object to a package delivery service, reading the RFID tag identification code number, accessing the corresponding owner information over the Internet from the computer system, returning the object to the owner, and using the owner's billing account information to charge the owner for the return of the object to the owner.

2. Method of claim 1 wherein the printed instructions include a promise of a reward if the finder returns the object to the package delivery service.

3. Method of claim 1 further including automatically notifying the owner that the object has been found, that it is being returned to the owner's address recorded in the computer system, and that the owner's credit card is being charged for the return delivery and any reward paid by the package delivery service to the finder of the lost object.

5. Method of claim 1 wherein the tag identification read by the RFID reading device is sent by the package delivery service as a query to a remote computer system over the Internet and the remote computer system answers the query by providing owner identification information, and the package delivery service in turn uses the owner information to return the object to the owner.

6. Method of claim 1 wherein the RFID tag can be electronically updated.

7. Method of claim 1 wherein the RFID tag also has delivery and account information electronically recorded thereon.

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Freeform Search

Database:
US Pre-Grant Publication Full-Text Database
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Derwent World Patents Index
IBM Technical Disclosure Bulletins

Term: L4 and object

Display: 50 **Documents in Display Format:** FRO **Starting with Number** 1

Generate: ○ Hit List ◉ Hit Count ○ Side by Side ○ Image

Search Clear Interrupt

Search History

DATE: Thursday, August 19, 2004 Printable Copy Create Case

Set Name side by side	**Query**	**Hit Count**	**Set Name** result set
	DB=USPT; PLUR=YES; OP=OR		
L8	L4 and interaction	2	L8
L7	L6 and interaction	2	L7
L6	L4 and object	16	L6
L5	L4 and servlet$	1	L5
L4	L3 and (identification near code)	20	L4
L3	L2 and (RFID near identification)	90	L3
L2	L1 and (RFID near tag)	140	L2
L1	RFID near reader	185	L1

END OF SEARCH HISTORY

paper wrapper
plastic cup

L9: Entry 2 of 2 File: USPT Jan 29, 2002

DOCUMENT-IDENTIFIER: US 6342839 B1
TITLE: Method and apparatus for a livestock data collection and management system

Abstract Text (1):
An efficient method and apparatus for livestock data collection and management is described to provide quality assurance source verification data and performance tracking for individual animals throughout the production cycle. The preferred embodiment includes unique radio frequency identification (RFID) transponders for each animal; unique RFID transponders for animal events; default event data capability; a portable and wireless RFID reader to read the animal and event transponders; a multiple input/output device to accept the reader signals and livestock measurement data and to communicate by means of a wireless radio communication to a host computer; a feedback signal from the host computer to acknowledge receipt of data; BeefLink.TM. software to provide data gathering, storage, and query support, and a protocol converter to facilitate the transfer and sharing of data between different livestock databases.

Brief Summary Text (13):
After the stockman phase, the animals are typically sent to a feedlot where they are fed a high-energy diet for about 120 days. At the feedlot, the cattle are in a finishing stage, where the main objective is to add pounds quickly while keeping the animals healthy. The cattle will be finished when they reach a weight of approximately 1,100 to 1,200 pounds. The feedlot is interested in animal weight gain, animal health, the effectiveness of various feed ration formulations, required waiting periods on shipping animals after drug treatments, and animal origin and history.

Brief Summary Text (17):
There is variability in individual animal production efficiency and in individual carcass quality characteristics such as weight, frame size, muscling, fat content, marbling, and feed efficiency. This variation is due to a combination of genetic factors and environmental factors such as health and drug treatments, nutrition, and growth history. Many of the genetic and environmental factors can be controlled or managed to improve both quality and economic return on investment if accurate historical information were available throughout the production cycle.

Brief Summary Text (22):
Although electronic identification through radio frequency identification (RFID) tags or barcodes are used in some phases of the livestock production cycle, there is a need to provide a means for individual animal identification throughout the production cycle and to minimize the difficulty of data entry throughout the industry.

Brief Summary Text (23):
RFID Readers

Brief Summary Text (24):
Several RFID readers are commercially available, typically from the transponder

suppliers, including models form Destron/Feating, Inc., Allflex USA, Inc. and Avid Marketing, Inc.

Brief Summary Text (25):
An object of the present invention is to provide an improved reader that supports the objectives of the livestock data collection and management system. The prior art includes RFID readers that can distinguish multiple types of RFID transponders as illustrated and described in U.S. Pat. No. 5,235,326, issued Aug. 10, 1993, "Multi-mode, identification system" to Michael L. Beigel, Nathaniel Polish, and Robert E. Malm.

Brief Summary Text (33):
U.S. Pat. No. 5,315,505 issued to William C. Pratt on May 24, 1994 for a "Method and system for providing animal health histories and tracking inventory of drugs" describes a method and system for providing improved drug treatment to selected animals in a retained group. A computer system is used to provide an operator with the health and drug treatment history of an animal. With this information and a diagnosis of the animal's health condition, a drug treatment is chosen. The diagnosis and treatment are entered into the computer system to update the animal's health and treatment history. An object of the present invention is to provide complete source verification and performance databases for all key livestock events.

Brief Summary Text (36):
An object of the present invention is to provide an effective data collection and database management methodology in the livestock industry including automated entry for individual animal identification; automated entry events and of default values for events and data in the processing cycle; and effective communication and sharing of data between the various databases. One result of this data collection and management invention is that quality assurance source verification data for individual animals will be available throughout the production cycle. This source verification will include the ability to implement HACCP plans. The source verification provides an opportunity for enhanced product value through improved quality assurance and food safety.

Brief Summary Text (41):
In accordance with the preferred embodiment of the present invention, a method and apparatus for a livestock data collection and management system is described. The objectives of the present invention are to provide an efficient and cost-effective system and method of livestock data collection and data management that will provide quality assurance, HACCP compliance, and source verification data for individual animals throughout the production cycle. The resulting information will provide a basis for the producer, the stockman, the feedlot, and the packer to make informed herd management and operational decisions. Components of the data collection and management system in the preferred embodiment include unique Radio Frequency Identification (RFID) transponders for each animal; a RFID Reader that can identify the animal transponders; a data concentrator which collects information from multiple measurement equipment or output devices; RF event action tags to automate data entry, preset event data default capability, and data transfer between databases to eliminate duplicate data entry.

Drawing Description Text (5):
FIG. 3 is a schematic showing a wired connection between the RFID reader and a host computer.

Drawing Description Text (6):
FIG. 4 is a schematic showing a wireless radio frequency data communication (RFDC) connection between the RFID reader and a host computer.

Drawing Description Text (7):

FIG. 5 is a schematic showing a wireless radio frequency data communication (RFDC) connection to a multiple input/output data concentrator device located between the RFID reader and a host computer.

Drawing Description Text (11):
FIG. 9 is a schematic showing a wireless radio frequency data communication (RFDC) connection between the RFID reader and a host computer and additional livestock databases.

Drawing Description Text (12):
FIG. 10 is a schematic showing a cabled connection between the RFID reader and a data concentrator device and a wireless connection to a host computer and additional livestock databases.

Drawing Description Text (13):
FIG. 11 is a schematic showing a wireless radio frequency data communication (RFDC) connection between multiple RFID readers and a data concentrator device and a wireless connection to a host computer and additional livestock databases.

Detailed Description Text (5):
Referring now to FIG. 5, an animal is uniquely identified by means of a radio frequency identification (RFID) ear tag 32 or other type of transponder. The preferred identification is an RFID ear tag such as those provided by Destron/Fearing, Inc., Allflex USA, Inc, Avid Marketing, Inc. Alternately, the identification may be by means of an RFID implant, a rumen bolus, or a collar fitting on a neck or leg.

Detailed Description Text (6):
This RFID identification is typically applied to young animals at the first opportunity to pen and work the animals, such as at an initial immunization. The RFID identification, typically will have previously been applied to older breeding animals, and will typically remain with the animal until slaughter.

Detailed Description Text (7):
As the animal is typically restrained in a working chute, its identification may be determined by means of an RFID reader 30. This identification is accomplished by placing the reader near, typically within six inches, of an RFID ear tag or implant transponder. The rumen bolus has a greater range. The preferred reader is described in more detail in an alternative embodiment described below.

Detailed Description Text (26):
BeefLink is comprised of hardware and software to permit the user to scan radio frequency identification (RFID) ear tabs, implants collars, or boli with radio frequency identification scan readers; to enter new animals; to look up information on existing animals; to input new events; and to run queries on the work done. One objective of the software is to display pertinent data on each animal and add new events to the record in the least intrusive manner. The new animal records and events recorded are uploaded and incorporated into a larger database. Communication with the larger database allows the user to receive downstream animal performance data at his own computer.

Detailed Description Text (27):
The minimum components necessary to operate the system are as follows: a host computer which is an IBM-compatible desktop or laptop computer with Windows.TM.95 (or higher) operating system; 50 MHz 486 processor; 8 MB RAM; one serial port; 300 MB hard drive; 14.4 Kbps modem; 3.5" Floppy disk drive; external power supply; MS-Access.TM.97 database software; BeefLink.TM. data collection software; Hand-held RFID reader with an RS-232 output capability; a null modem cable (DB9F to DB9M) up to 50 feet between laptop and reader; and RFID transponders on each animal.

Detailed Description Text (35):
The RFID reader typically communicates either wirelessly or through a cable to the "Comm 1" serial port on the data concentrator unit. In some cases, the reader will be the only equipment used, and no equipment setup will be required. In some simpler applications, a data concentrator unit may not be used, and the reader may be connected directly to a computer port, or communicate in a wireless fashion to a radio receiver/transmitter which is connected directly to a computer port.

Detailed Description Text (36):
If equipment in addition to the RFID reader is used, it will be connected through a serial port on the Data Concentrator unit. The Data Concentrator unit has multiple serial ports, each of which is default labeled for specific types of equipment which is commonly used in the beef industry. The user simply plugs each device into the proper port on the Data Concentrator unit.

Detailed Description Text (44):
The RFID reader is always connected to port 1, and is used to read both animal ID tags and event tags. Its configuration cannot be changed. Port 2 is connected to an electronic weigh scale and is used to collect animal weights. Port 3 is configured for a digital thermometer and is used to collect body temperatures. Port 4 is connected to ultrasound equipment used to measure back fat. Port 5 is connected to a bar code scanner and is used for collecting the identity of drugs used as treatments. Port 6 is connected to a remote printer that prints labels for veterinary samples that are being collected.

Detailed Description Text (50):
To add or change an Action Tag associated with an event, the user first connects the RFID reader to Comm 1 of his Data Concentrator unit. The user then scans the Action Tag, and the unique transponder number of the tag will appear in the first text box of the setup screen. The user can then select or type the new assigned event. The same procedure can be repeated for as many Action Tags as desired to link to new events and details.

Detailed Description Text (149):
With the RFID reader cabled or wireless radio cabled to Comm 1, the user is ready to start scanning animals.

Detailed Description Text (157):
If an animal loses its RFID tag the animal can be re-tagged, and an Action Tag with "RETAG" as the event can be used to replace the old tag references. The system can be used with visual ID tags and barcode tags, but RFID transponder ear tags are the preferred identification method.

Detailed Description Text (178):
FIG. 3 illustrates a simple embodiment of the BeefLink data collection software with an RFID reader 30, which was linked by cable 33 to a host computer 10. In this case, animal identification would be obtained from an RFID transponder 32, and Work Cards 31 where RFID event transponders are used to record events.

Detailed Description Text (184):
FIG. 4 illustrates a simple embodiment of the BeefLink data collection software with a radio frequency wireless connection 40 between the RFID reader 30 and the host computer 10. In this case, animal identification would be obtained from an RFID transponder 32, and Work Cards 31 with RFID event transponders are used to record events.

Detailed Description Text (190):
FIG. 9 illustrates this existing system or existing database communication in a wireless reader embodiment. The RFID reader 30 communicates through RFDC transmitter/receivers 36 and 71.

Detailed Description Text (194):
FIG. 11 illustrates a wireless reader configuration where the data concentrator 50 receives data from multiple RFID readers indicated by readers 30 and 45. This type of configuration is desirable in larger operations where there may be more than one livestock working area at a given time. In this case, a larger antenna 63 may be necessary at the data concentrator, and it may be desirable to have a keyboard 261 and monitor 262 connected to the data concentrator.

Detailed Description Text (197):
The preferred embodiment is a data collection and management system for beef cattle production as indicated by FIG. 12. The components of the data collection and management system in the preferred embodiment include unique Radio Frequency Identification (RFID) transponders for each animal; an Action Card of RFID transponders to identify livestock events, an RFID Reader that can identify the animal and event RFID transponders; a wireless RFDC communication between the reader and a data consolidator unit which has multiple ports for livestock measurement data,; a multi-ported data concentrator unit for connection to a scale, a thermometer, an ultrasound measurement device, and an output device, a wireless RFDC communication between the data concentrator unit and the host computer, BeefLink.TM. Data Collection Software; and database protocol converter communication and integration tools.

Detailed Description Text (198):
Radio Frequency Identification (RFID) Transponders

Detailed Description Text (199):
Although the data collection system can operate manually with visual animal identification, the preferred operation is with Radio Frequency Identification (RFID) transponders 32 in the form of electronic ear tags, implants, boli or neck or leg collars to provide unique identification for each animal. Although ear tags and implants are the most common devices, a bolus transponder has been used successfully as a tamper-proof means of identification of cattle. The bolus transponder has the potential capability of measuring temperature and pH within the animal. The RFID transponders contain a small antenna attached to an integrated circuit that stores a unique identification number. Unlike bar codes, RFID transponders do not require line-of-sight to be read, the transponder simply needs to come into the proximity of an RFID reader.

Detailed Description Text (200):
RFID Reader

Detailed Description Text (201):
The RFID reader 30 will typically be stationary reader at high volume at the packer or feedlot operations and portable readers at the processing points. Stationary readers will be typically be connected to a host computer or data consolidator by means of a cable, but a wireless connection may also be used for stationary readers. The portable readers will typically use a wireless connection to the computer. The Readers emit a low radio frequency, typically a 134.2 kHz signal that excites the passive transponder in the event or animal identification tag. Once excited, the transponder responds back to the reader via radio frequency with a digital signal representing its unique identification. The reader decodes the signal, displays the identification, and sends the identification to the computer.

Detailed Description Text (203):
A Work Card 31 with RFID transponders 41, 42 and 43 provides livestock event identification so that events can be read by the RFID reader rather than entered by keyboard. The user may select one or more event cards for the anticipated work session. Other event tags may be more permanently affixed at other convenient locations in the work area, such as around the processing chute. The tags on the

work card have the name or symbol label for the corresponding events so that the person working the cattle can quickly scan the appropriate event when it occurs.

Detailed Description Text (205):
A hardware device called a Data Concentrator 50 is used as a hub to receive inputs from multiple peripherals and to send the data to the processing computer 10. Although the connection between the data concentrator and the computer may be cabled in some high volume applications, the preferred embodiment is radio frequency wireless data communication One communication port on the data concentrator will typically be dedicated to the RFDC transmitter/receiver, and the host computer will be ported to a transmitter/receiver. Serial data can be both transmitted and received between the computer and the concentrator using standard direct-connect serial cables or via radio frequency data communication (RFDC). The Data Concentrator accepts a signal from the reader through RFDC transmitter/receivers 36 and 71, typically from a serial port 53, and may also accept data from other measurement devices or provide data to output devices through other available ports 54, 55, 56, and 57. These devices can include electronic weigh scales for weighing animals, digital thermometers to determine if an animal has a fever, bar code scanners to scan drug containers, and ultrasound equipment to measure back fat and detect pregnancy. Other peripherals include output devices that notify the user of the results of an input such as a light, an audible signal to signify that the input has reached the computer, an LED display, or an electronic voice response. A preferred model of the data concentrator is Western Telematic Model STC61, which is a 6 serial port unit.

Detailed Description Text (210):
Data collected at the local level can provide only limited management information to the producer because the producer needs to know the performance results in order to manage accurately for the future. As the data is transferred to a regional or national database, indicated in as 78, it can become more powerful. In many cases, the animals change hands during the production cycle. In order to get results back to the producers and growers of the livestock, these upstream participants must have the ability to pull information about the animals that the downstream participants enter into the system. Likewise, the downstream participants such as feedlots and packers need to review information on the animals that they are receiving. It is also these large databases that allow for the source verification for food safety issues.

Detailed Description Text (216):
In the preferred embodiment, the RFID tags, and visual identification tags are correlated so that at any point in the livestock cycle, historical data is available to any entity in the chain of title for the livestock.

CLAIMS:

38. The method of claim 31 comprising the additional steps:

identifying an animal with a visual identification code;

entering the visual identification code to the host computer such that animal event data may be accessed by the visual identification code.

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L8: Entry 2 of 2 File: USPT Feb 25, 2003

DOCUMENT-IDENTIFIER: US 6526158 B1
TITLE: Method and system for obtaining person-specific images in a public venue

Detailed Description Text (5):
The combination of the steps of subject remote identification 31 and the step of image capture 33 is of paramount importance in the present invention. By automatically establishing the identity of the subjects within a captured image with remote identification 31, images can be stored and then retrieved by individual theme park patrons without the need for human intervention or conscious interaction (such as remembering a number) to aid image distribution 39 to the proper patron. This removes a practical bottleneck in the distribution of images in a large public venue.

Detailed Description Text (9):
The step of image distribution 39 is carried out at a kiosk 75 which incorporates a distribution station 77. The distribution station 77 incorporates a monitor 85 on which captured images are displayed for the patron 43 to review. An integral remote ID reader 51 is included to identify the patron 43, so as to determine which images are to be retrieved from the image storage device 71 through distribution cable 81. Interaction means are provided to the patron 43 to select and choose images by presentation of the images on a viewing screen 85. Chosen images may be printed in the workstation 77 and distributed to the patron through image distribution slot 87.

Detailed Description Text (10):
The interaction means may include a plurality of buttons 83 and 84 supplemented by a speaker 79 for communicating audible commands and assistance to the patron 43. In this case, the button 83 is labeled "YES" and the button 84 is labeled "NO". Depending on the nature of the queries presented on the screen, these buttons 83 and 84 can be used to either select images for purchase, or to select the format on which the images should be delivered. For example, the screen could present the query, "Would you like the pictures to be printed on paper?" and by pressing the button 83 or the button 84, the patron 43 would determine whether the images were printed on paper.

Detailed Description Text (20):
Examples of remote identification include radio frequency identification (RFID), LED transmission with photodetector detection, sonic transmitters and microphones, and visual identification means such as bar coding, facial recognition, iris scanning, and visual symbology coding. In these techniques, there is no physical contact between the object being identified and the mechanism which performs the identification. While some of these methods work at distances of a mile or more, most of these operate best in the ranges of inches to tens of feet, which is the proper distance for the present invention. It should be understood that remote identification as applied to this invention may involve relatively small distances on the order of less than a foot.

Detailed Description Text (25):

Radio Frequency Identification (RFID)

Detailed Description Text (26):
Radio frequency identification (RFID), in overview, involves a mobile radio transmitter which is prompted to transmit a short digital identification signal (often between 32 to 128 bits) in response to an interrogation radio frequency signal. The mobile radio frequency transmitter generally signals either in the 30-500 kHz or 0.9-3 GHz ranges. The RFID transmitter comes in two general forms passive or active. In active RFID, a miniature battery or other source of power is packaged locally to the mobile transmitter. Generally, active RFID devices transmit over distances of feet to tens of feet, but these distances may sometimes range to thousands of feet.

Detailed Description Text (28):
One embodiment of an RFID remote identification device is shown in FIG. 4a, a perspective diagram. In this case, the identifier involves a bracelet 89 that is worn by the person to be detected. The bracelet 89 incorporates an RFID tag 91, which both detects an interrogation signal 95 from an RFID reader 54, as well as transmits a digital identification radio signal 93 that is detected by the RFID reader 54. The RFID reader 54 comprises electronics which perform both the transmission of the interrogation signal 95 and the reception of the digital identification radio signal 93. The bracelet 89 could be alternatively chosen from a number of worn or carried accessories, including a necklace, a pin, a badge, a card, or a small figurine, with the limitation that it would need sufficient free volume and cross-sectional area to incorporate the RFID tag 91 components, including a radio receiver, transmitter, and possibly a battery (in the case of an active RFID transmitter)

Detailed Description Text (29):
The RFID tag 91 could be either a passive or an active RFID transmitter. If the tag 91 is an active RFID tag, it would also incorporate a source of power such as a battery.

Detailed Description Text (30):
The use of an interrogation means in the tag 91 is not required. For instance, the radio signal 93 could be continuously transmitted or transmitted in discrete and frequent bursts, rather than only in response to the interrogation signal 95. This mode of operation, however, would require an active RFID design and a more substantial power supply local to the RFID tag 91 to power this frequent transmission.

Detailed Description Text (72):
The sites of client interaction and the distribution of materials may vary. FIG. 6a and FIG. 6b are block schematics of two different methods for integrating printing into distribution. FIG. 6a denotes the distribution scheme as shown in FIG. 2. Data from the remote identification reader 52 is received over identification transfer wire 53, and the image is received through image transfer wire 65, where these two pieces of information are transferred by the storage controller 73 to the storage device 71. Distribution stations 77 are connected to the storage controller by the distribution cables 81. Within each distribution station 77 is a printer 137 for the production of a printed image for delivery to a patron 43 at the distribution station 77. The distribution cable 81, it should be noted, must allow for bi-directional communication, in which requests for images are sent from the distribution station 77 to the storage controller 73, and images are sent from the storage controller 73 back to the distribution station 77.

Detailed Description Text (73):
FIG. 6b denotes an alternative distribution scheme in which the printers 137 are not located at the distribution station 77. In this case, the distribution station 77 is used only for patron 43 interaction, where images are reviewed and selected.

Requests for printing are sent from the distribution station 77 to the storage controller 73. The storage controller 73 retrieves the requested image from the storage device 71, and then routes the image to a suitable printer 137 for printing. The suitability of a particular printer 137 may be determined by the characteristics of the printing output specified, such as the size of the print, or the substrate on which the print is made (ceramic mugs, metallic films, fabrics or posters). Alternatively, the printing resource may be chosen on the basis of its availability. This distribution scheme effectively utilizes printing resources, which can be fully occupied with requests from a large number of distribution stations 77, allowing for economies of scale. For instance, photographic image albums might be best produced on high-volume machinery, which, may have advantages of higher speed and lower cost, and may additionally have special features, such as automatic binding.

Detailed Description Text (74):
In many cases, printing may be performed at times distinct from patron 43 interaction at the distribution station 77. For example, the patron 43 may choose images at the distribution station 77, and the images may be transferred to the appropriate medium (paper, T-shirt, or mug) at a later time for delivery to the patron 43, either later in the day or on a different day, possibly through mail delivery.

Detailed Description Text (81):
FIG. 7 is a pictorial schematic of an embodiment of the present invention where video images rather than single frame images are captured, and where the images are stored directly in an output format. The step of remote identification 141 is similar to that of FIG. 2 and FIG. 3, discussed above. However, instead of using the digital still camera 63, a videocamera 157 is used instead to capture videographic images. The term "videograph" is used to refer to videorecorded images comprising multiple image frames of continuous video recording. A directional microphone 158 is connected to the videocamera 157, and transmits its audio input to the videocamera 157. The RFID reader 54 is connected to the videocamera 157 via a local identification transfer wire 56, transferring the identification transmitted by the tag 49 to the videocamera 157.

Detailed Description Text (82):
The output from the videocamera 157 contains videographic images captured by the videocamera 157, the audio signals from the directional microphone 158, and the identifier obtained from the RFID reader 52. These signals may be multiplexed by the videocamera 157 and associated electronics (which may include a microprocessor-based computer) in a manner similar to that shown in FIG. 5. For example, the audio information and identifiers may be placed either in the space between individual lines (rows) of video data, or in the interframe spaces. This multiplexed data is transferred via videographic image transfer wire 66 to an image/audio router 155, which accepts input from the videographic image transfer wire 66 at image input connector 159.

Detailed Description Text (83):
It should be noted that numerous configurations of data collection and transfer are within the spirit of the invention. For example, discrete transfer wires could transfer information individually from the videocamera 157, the directional microphone 158 and the RFID reader 54 to the image/audio router 155, without the need for data multiplexing. Alternatively, the directional microphone 158 could be integral to the videocamera 157. In addition, instead of the multiplexing taking place within the videocamera 157, requiring specialized hardware within the videocamera 157, it might be convenient for a separate local controller to accept input from the various devices (the videocamera 157, the microphone 158 and the RFID reader 54) and perform the multiplexing, prior to transfer over the videographic image transfer wire 66 to the router 155.

Detailed Description Text (87):
It should be noted that this embodiment does not generally include a separate means of allowing the patron 43 to pick and choose from among images at a distribution station 77. Instead, because the images pertaining to the patron 43 are stored in permanent format, the patron 43 must simply choose whether or not to purchase the permanent output. FIG. 8 is a block schematic of data flow for an embodiment of the present invention, whereby segments of information are stored in a temporary storage means for the patron 43 to preview the stored images, without requiring all of the information to be easily available from permanent storage. A collection of images 289 from the videocamera 157 and the identification from RFID reader 54 are transferred in their totality to permanent storage. As a collection of permanently stored images 291, this data in its entirety is made available for distribution in a distribution step 293 to the patron 43, but large portions of the image collection 289 may be unavailable for the patron 43 to review prior to the distribution step 293. However, a subset of the image collection 289, perhaps single frames or a short segment from a videotape, are collected as temporarily stored images 295 which are stored on as temporary storage device. These temporarily stored images 295 are made available for the patron 43 in a review step 297, wherein the patron 43 reviews the temporarily stored image subset 295 of the permanently stored images 291 to determine whether to purchase the permanently stored images 291. Once the patron purchases the permanently stored images 291, the temporarily stored images 295 may be overwritten or deleted.

Detailed Description Text (89):
The previous embodiments of the present invention involve the electronic transfer of data from the image capture and remote identification means to a common identified image storage device. In certain venues, the electronic communication between distant sites may be expensive or inconvenient. FIG. 9 is a schematic of an alternative system configuration utilizing storage devices local to image capture and remote identification means, wherein the stored information is physically transferred to a central identified image storage device. Multiple videocameras 157 and their associated RFID readers 54 are each connected to a local temporary storage device 167. The temporary storage device 167 utilizes a removable storage medium 169 on which both the image information from the videocamera 157 as well as the identification information from the RFID reader 54 is stored. The removable storage medium 169 may comprise a removable magnetic disk, a magnetic tape, or other such medium which may store electronic information and be physically transported separately from its recording electronics.

Detailed Description Text (130):
The previous embodiments of the present invention can be integrated seamlessly into the normal operations of entertainment venues, such as theme and amusement parks, so that image capture does not intrude on the entertainment that the patron obtains on the rides or at the activities of the venue. Indeed, the patron may well not be aware that image capture is taking place during the activity. The following modes of use of the present invention, however, provide active integration of image capture and remote identification into rides and activities, where the patron is both conscious of image capture, and actively participates in interaction with picture taking and review.

Detailed Description Text (137):
The act of picture taking, especially where the result is a modified image of the patron 43, can be very entertaining. The next two embodiments of the present invention integrate the act of taking and reviewing images an intrinsic part of the entertainment process. FIG. 18 is a top-perspective view of a waiting line in which image capture, modification and review are used to entertain patrons 43. Numerous patrons 43, each with an RFID bracelet tag 91, are in a waiting line, bordered by horizontal poles 271 similar to that shown in FIG. 17. Their direction of motion is shown by arrows on the left and right. At a U-bend in the waiting line, the poles 271 are arranged to form a pocket 279 in which the patron 43 closest to the pocket

279 steps. The RFID reader 54 is placed in front of the pocket, so as to identify the patron 43 in the pocket. The digital camera 63 sits on top of a large monitor 281, and captures an image of the patron 43. An entertainment venue operator 283 stands next to the pocket 279 in order to operate the system, and will generally press a button 285 located on a console in order to activate the image capture.

Detailed Description Text (141):
The use of the remote identification methods (involving the RFID bracelet 91 and the RFID reader 54) is necessary to allow the patron 43 to purchase the images at some time later. Because of the requirements of maintaining movement in the waiting line, the patron 43 will be unable to purchase the printed images while waiting in line. Thus, the remote identification methods associate the patron 43 with the image, and permit the sale of the image to be made at a later time, as described above (see, for example, FIG. 2).

Detailed Description Text (153):
While the patron 43 is performing the task, an integral remote identification reader 51 reads the bracelet-mounted RFID tag 91 worn by the patron 43. Furthermore, images of the motions performed by the patron 43 are recorded by a videographic camera 269 mounted in a recess behind a transparent glass frame 267, and with illumination controlled so that the camera is not easily noticeable to the patron 43. The camera is mounted on a wall 265 that is at an angle to the monitor 259, so that well-positioned images can be obtained of the patron 43 profile, as well as the patron's hand.

CLAIMS:

33. A system of capturing and distributing images of patrons in a venue, comprising: an identifier physically-associated with each patron wherein the identifier encodes a substantially unique identification code; an image capturing device which captures electronic visual images of the patrons; a directional sensor remote from the patrons which is receptive of the identifier, wherein the image capturing device and the directional sensor operate substantially simultaneously; an electronic decoder associated with the sensor which decodes the identification code received by the sensor from the identifier; a storage device associated with the image capturing device and the decoder and receptive of the electronic visual images and identification codes, wherein the electronic visual images are stored in association with the related identification codes; and a selector associated with the storage device which retrieves electronic visual images when provided with the related patron identification codes.

50. The system of claim 33, additionally including a printer associated with the selector, wherein the printer prints visual images of the patrons when the selector is provided with the related patron identification codes.

55. The system of claim 33, additionally including a second directional sensor associated with the selector which is receptive of the identification code encoded in the identifier, wherein the second directional sensor provides identification codes to the selector.

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DOCUMENT-IDENTIFIER: US 6232870 B1
**** See image for Certificate of Correction ****
TITLE: Applications for radio frequency identification systems

Abstract Text (1):
The present invention relates to RFID devices, including handheld RFID devices, and applications for such devices. The devices and applications may be used in connection with items that are associated with an RFID tag, and optionally a magnetic security element. The devices and applications are described with particular reference to library materials such as books, periodicals, and magnetic and optical media.

Brief Summary Text (2):
The invention relates to applications for radio frequency identification (RFID) systems, and particularly to the use of such systems in libraries.

Brief Summary Text (4):
Electronic article surveillance ("EAS") systems detect the presence of small electronic devices placed on or in an article or carried by a person of interest, and are often used in retail or library environments to deter theft or other unauthorized removal of articles. These devices, which are commonly known as tags or markers, have in the past contained only information regarding the presence of an item. This information could be obtained by electronically interrogating the tag, either intermittently or continuously. At least four distinct types of EAS systems have evolved over the years, based on how this interrogation was carried out: magnetic, magnetomechanical, radio frequency (RF), and microwave. Of these four, magnetic systems have provided the highest level of security in most applications. Magnetic tags are easily hidden in or on an object, difficult to detect (because they are less susceptible to shielding, bending, and pressure), and easy to deactivate and reactivate, thereby providing a high degree of security and some information regarding the status of the tagged article.

Brief Summary Text (5):
Many users of EAS systems desire to know more than just whether a tagged object is present. They also want to know which tagged object is present, for example. Detailed information regarding the characteristics of objects, such as their date of manufacture, inventory status, and owner have generally been communicated to automated handling and control systems through an optical bar code. While inexpensive and effective, the optical bar code system has certain limitations. Bar codes must be visible, which limits the locations in which they may be placed, and bar codes can easily be obscured, either accidentally or intentionally. The range at which a detector can sense the bar code is also comparatively small. The bar code may also have to be appropriately positioned for detection. Also, because bar codes are often exposed to permit detection, the barcode is susceptible to damage that can result in detection failures. Lastly, multiple items must be processed one at a time. These constraints of bar code systems make them undesirable or inefficient for some applications, such as marking library media.

Brief Summary Text (6):
More recently, electronic identification (also known as radio frequency

identification or RFID) techniques have been developed to address the limitations of optical barcodes. RFID systems have succeeded in providing object identification and tracking, but are deficient in providing object security because most RFID systems operate in frequency ranges (.about.1 MHz and above) in which the tag is easily defeated. The security deficiency associated with radio frequency tags arises because they can be "shielded" by, for example, covering the tag with a hand or aluminum foil, or even placing the tag in a book. Even battery-powered radio frequency tags may be blocked, although their range is superior and blocking would be more difficult. Thus, objects tagged with an RFID tag may escape detection, either inadvertently or intentionally. This greatly reduces their effectiveness as security devices. RFID markers are also related to "smart cards." Both contact and contactless smart cards have appeared in commercial applications. Smart cards tend to be associated with a specific person rather than with a tagged object. Issues related to the security and tracking of the smart card (or of the person carrying it) are similar to those discussed above for RFID markers.

Brief Summary Text (10):
From the foregoing discussion, it should be clear that there are a number of applications for RFID tags in various environments in which the identity of the tagged item is important. For example, PCT Publication WO 99/05660, published Feb. 4, 1999 and assigned to Checkpoint Systems, Inc., describes an inventory system using articles with RFID tags. The preferred embodiment described therein contemplates the use of RFID tags in library materials, which may then be checked out automatically by interrogating the RFID tag to determine the identity of the material. However, a number of important or desirable library or other inventory functions remain that are not described or suggested in the '660 publication.

Brief Summary Text (12):
The present invention relates to RFID devices, including handheld RFID devices, and applications for such devices. The devices and applications may be used in connection with items that are associated with an RFID tag, and optionally a magnetic security element. The devices and applications are described with particular reference to library materials such as books, periodicals, and magnetic and optical media. Other applications for the present invention are also envisioned.

Drawing Description Text (6):
FIG. 4 is a block diagram of an RFID interrogation system interacting with an RFID tag;

Detailed Description Text (2):
The embodiments of the present invention described herein make use of RFID tags, and preferably of combination RFID/magnetic security tags. Tags of this type were disclosed in U.S. application Ser. No. 09/093,120, filed Jun. 8, 1998 and entitled "Identification Tag With Enhanced Security," which was assigned to the assignee of the present invention and was incorporated by reference into the U.S. application from which the present application claims priority. A detailed description of the magnetic, RFID, and combination tags used in conjunction with the embodiments of the present invention is described in Section I, below, and the embodiments of the present invention are then set forth in detail in Section II, below.

Detailed Description Text (4):
A tag used with the embodiments of the invention described in Section II, below, may incorporate both object identification and effective security in a single device. They preferably include an element that is responsive to a magnetic interrogation signal, and an element that is responsive to a radio frequency interrogation signal. In one embodiment, the magnetically-responsive element also provides the antenna for the radio frequency-responsive element. The term "responsive" means, in the context of the present invention, that the element provides intelligible information when subjected to an appropriate interrogation

field. The individual elements are described first below, followed by a description of a combination tag. As will become apparent, the embodiments of the present invention described in Section II, below, may include either an RFID element alone, or a combination of an RFID element and a magnetic security element.

Detailed Description Text (12):
RFID tags can be either active or passive. An active tag incorporates an additional energy source, such as a battery, into the tag construction. This energy source permits active RFID tags to create and transmit strong response signals even in regions where the interrogating radio frequency field is weak, and thus an active RFID tag can be detected at greater range. However, the relatively short lifetime of the battery limits the useful life of the tag. In addition, the battery adds to the size and cost of the tag. A passive tag derives the energy needed to power the tag from the interrogating radio frequency field, and uses that energy to transmit response codes by modulating the impedance the antenna presents to the interrogating field, thereby modulating the signal reflected back to the reader antenna. Thus, their range is more limited. Because passive tags are preferred for many applications, the remainder of the discussion will be confined to this class of tag. Those skilled in the art, however, will recognize that these two types of tags share many features and that both can be used with this invention.

Detailed Description Text (14):
The antenna geometry and properties depend on the desired operating frequency of the RFID portion of the tag. For example, 2.45 GHz (or similar) RFID tags would typically include a dipole antenna, such as the linear dipole antennas 4a shown in FIG. 1A, or the folded dipole antennas 14a shown attached to the radio frequency responsive element 10a in FIG. 1B. A 13.56 MHz (or similar) RFID tag would use a spiral or coil antenna 14b, as shown attached to the radio frequency responsive element 10b in FIG. 2. In either case, the antenna 14 intercepts the radio frequency energy radiated by an interrogation source. This signal energy carries both power and commands to the tag. The antenna enables the RF-responsive element to absorb energy sufficient to power the IC chip and thereby provide the response to be detected. Thus, the characteristics of the antenna must be matched to the system in which it is incorporated. In the case of tags operating in the high MHz to GHz range, the most important characteristic is the antenna length. Typically, the effective length of a dipole antenna is selected so that it is close to a half wavelength or multiple half wavelength of the interrogation signal. In the case of tags operating in the low to mid MHz region (13.56 MHz, for example) where a half wavelength antenna is impractical due to size limitations, the important characteristics are antenna inductance and the number of turns on the antenna coil. For both antenna types, good electrical conductivity is required. Typically, metals such as copper or aluminum would be used, but other conductors, including magnetic metals such as permalloy, are also acceptable and are, in fact, preferred for purposes of this invention. It is also important that the input impedance of the selected IC chip match the impedance of the antenna for maximum energy transfer. Additional information about antennas is known to those of ordinary skill in the art from, for example, reference texts such as J. D. Kraus, Antennas (2d ed. 1988, McGraw-Hill, Inc., New York).

Detailed Description Text (22):
Modern RFID tags also provide significant amounts of user accessible memory, sometimes in the form of read-only memory or write-once memory, but more preferably offering the user the ability to repeatedly update the memory by rewriting its contents from a distance. The amount of memory provided can vary, and influences the size and cost of the integrated circuit portion of an RFID tag. Typically, between 128 bits and 512 bits of total memory can be provided economically. For example an RFID tag available from Texas Instruments of Dallas, Tex., under the designation "Tag-it" provides 256 bits of user programmable memory in addition to 128 bits of memory reserved for items such as the unique tag serial number, version and manufacturing information, and the like. Similarly, an RFID tag available from

Philips Semiconductors of Eindhoven, Netherlands, under the designation "I-Code" provides 384 bits of user memory along with an additional 128 bits reserved for the aforementioned types of information.

Detailed Description Text (23):
This user accessible memory may be exploited to enhance the performance of an item identification system deployed, for example, in a library environment. Presently, libraries identify items by scanning an optical barcode. The unique identifier contained in this barcode is used to access a circulation database including software provided by library automation vendors (LAV software), where more extensive information about the item is permanently maintained. While this system has been highly developed and works very well in many applications, it may have two disadvantages. First, a connection to the circulation database must be established to access the information. This limits the availability of the information when an item is at a location remote from a connection to this database. Second, the retrieval of information from the circulation database can sometimes require an unacceptably long time, particularly during periods of heavy use. By storing certain critical items of information on the RFID tag, both of these limitations can be overcome.

Detailed Description Text (24):
One example of information which could improve the performance of a library identification system if present on the RFID tag itself would be a library identification number. Then, without accessing a database, an item's "home" library could be quickly and conveniently determined by simply scanning the RFID label. Another example of information preferably present on an RFID tag itself would be a code designating whether the item was a book, a video tape, an audio tape, a CD, or some other item. This code could, for example, comprise the media type code specified in the 3M Standard Interchange Protocol, which is available from the assignee of the present invention. By immediately knowing the media type, a library's material management systems could insure that an item was being appropriately processed without incurring the delay and inconvenience of consulting a remote circulation database. Other examples of information suitable for incorporation into the RFID label will be apparent to those skilled in the art.

Detailed Description Text (25):
Another area in which RFID systems offer an advantage over barcode-based systems is in the identification of multiple items. By using sophisticated software algorithms, RFID readers and markers cooperate to insure that all items in the reader's interrogation zone are successfully identified without intervention by the operator. This capability enables the development of numerous useful applications in the areas of inventory control, item tracking, and sorting that would be difficult of impossible to implement with barcode-based identification systems.

Detailed Description Text (28):
The combination tag made according to the present invention may be interrogated two ways. First, the RFID interrogation source would use radio frequency signals to request and receive codes from the integrated circuit. This information would indicate, for example, the identification of the article with which the tag is associated, and whether the article had been properly processed. Second, a magnetic interrogation field would interrogate the tag to determine whether the magnetic portion of the marker assembly was active. If the marker assembly was active, the interrogation source would produce a response, such as a notification that the marked article had not been properly processed. Because the magnetic interrogation is more resistant to shielding than the radio frequency interrogation, the magnetic portion of the combination tag would provide enhanced security. Thus, the features of both magnetic and RFID tags are combined into a single combination tag.

Detailed Description Text (37):
The combination tag is believed to have particular, although not exclusive, use in

the processing of library materials. Library materials having an RFID tag of this type could be checked in and out more easily, perhaps without human assistance. That is, the materials would automatically be checked out to a particular patron (who may herself have an RFID tag associated with her library card) when the patron passes through a suitable detection zone, and checked back in when the patron re-enters the library with the materials. The tag of the invention may also assist in inventory management and analysis, by enabling library administrators to keep track of materials instantaneously and continuously. These and other features of the invention can, of course, be brought to bear on other applications, such as materials handling in stores, warehouses, and the like.

Detailed Description Text (41):
A combination tag was made in accordance with the present invention. A permalloy strip produced from an alloy available from the Carpenter Technology Corporation of Reading, Pennsylvania under the designation "HyMu80" was attached to a test fixture manufactured by Single Chip Systems (SCS) of San Diego, Calif. The strip measured approximately 1.6 mm (0.625 in) wide by 0.0254 mm (0.001 in) thick by 10.16 cm (4 in) long. The test fixture consisted of a standard SCS 2.45 GHz antenna connected to an LED diode. The device was designed so that upon exposure to a 2.45 GHz field strong enough to power a typical SCS RFID tag the LED would glow, providing an immediate visible confirmation of the proper operation of the power-receiving portion of the device. Upon replacing the standard SCS antenna with the prototype permalloy antenna, the LED illuminated at approximately the same field strength, confirming the successful operation of the prototype.

Detailed Description Text (48):
Because RFID tags may be shielded either intentionally or unintentionally by a library patron, it is often important to provide both RFID and magnetic security elements in the tagged library material, preferably on the same tag. When the magnetic security element is dual status, meaning that it may be selectively activated and deactivated, its status is typically changed by the application of a magnetic field to that element. Magnetization operations such as this have no effect on library materials such as books and magazines, but can have harmful effects on magnetically-recorded media. The inventive RFID device with magnetic capabilities solves such problems, preferably without any involvement by library staff members.

Detailed Description Text (49):
As shown in FIG. 9, an RFID device is equipped to read information from an RFID tag on an item, such as a patron card, book, or other material. Preferably, the information read from the RFID tag includes a designation of media type (magnetic, print, or optical, for example), which can be used to insure the proper subsequent processing of the item. The RFID device is also equipped with a device, such as the coil, designed to enable the activation and deactivation of the security element portion of the item tag. After the RFID device reads the RFID tag, the device transmits the item identification information to a computer having software provided by a library automation vendor, or LAV. Among approximately 50 current LAV software systems are "Dynix," which is available from Ameritech Library Services of Provo, Utah, "Carl ILS" which is available from CARL Corporation of Denver, Colo., and "DRA," which is available from DRA, of St. Louis, Mo.

Detailed Description Text (50):
There are a number of ways to transmit the information obtained from an RFID tag to the LAV system. One would involve using the commands implemented in the 3M Standard Interchange Protocol (SIP). Another would involve using an electronic device known as a "wedge" to transmit the information as if it originated from a conventional barcode scanner. These and other techniques are well-known to those skilled in the art. In this manner, the RFID component of the RFID device performs the functions formerly performed by an optical bar-code scanner, which may or may not continue to be used with the device. Thus, libraries may continue to use their existing LAV

software system interfaces and terminals while enjoying the added functionality and features provided by RFID technology. The RFID device need not include a display if it would cooperate with an existing LAV software system display to provide feedback to the operator. Optionally, a display and other feedback mechanisms may be included in the RFID device as an integrated package.

Detailed Description Text (51):
In devices having both RF and optical bar code reading capabilities, the device should be able to handle library materials tagged with RF tags, bar code labels, or both. In operation, the device would process an item for check-in by scanning for an RFID tag, a barcode, or both, retrieving the item identification code and, preferably, the media type from one or both of these tags, and passing this information on to the LAV software system. When the device includes both an RFID system and an optical bar code scanning system, the device may also be used to create RFID tags for media that is only bar-coded. First, the bar code would be scanned, and then the identifier (or an ID code associated with that identifier, depending on system design) would be written to (recorded onto) the RFID tag along with other data, such as media type and other selected information returned from the LAV software system relative to that media. The RFID tag could then be applied to the item.

Detailed Description Text (52):
The RFID device of the present invention preferably also performs "smart" resensitizing and desensitizing of the magnetic security elements attached to library materials. When the device reads the RFID tag and transmits the identification information to the LAV software, the LAV software can be programmed to respond with an indication of the type of library material with which the RFID tag is associated. If the LAV software responds with an indication that the tagged material is something for which a specialized magnetization operation is required (magnetically-recorded media, typically), then the device can activate only the system that performs that operation. For example, if the LAV software indicates that the RFID tag is associated with an ordinary book, and that the book may be checked out by the requesting patron, then one magnetization system may be activated to deactivate the magnetic element associated with that book. However, if the LAV software indicates that an RFID tag is associated with a video tape, for example, then a different magnetization system may be activated to deactivate the magnetic security element associated with that video tape. This different magnetization system might involve, for example, a weaker magnetic field or a field confined to the region in the immediate vicinity of the security element, so as to prevent damage to the magnetic media itself, depending on the detailed characteristics of the security tags in use. Depending on the detailed design of the device, the procedure might include inhibiting automatic activation so as not to damage magnetic media.

Detailed Description Text (53):
Preferably, sufficient information may be stored in the memory of the RFID tag itself that the interrogation source need not transmit that information to the LAV software, and can instead invoke the appropriate magnetization system directly. This embodiment would likely improve system performance, because fewer steps are required to reach the same result. As a minimum, the RFID tag should store a media type in the memory of the RFID element, but could as noted above include additional information. This type of processing, without transmission back to a database separate from the RFID device, is referred to herein as happening in "real time."

Detailed Description Text (54):
An advantage of an RFID device such as that described is that it may accept and process items with less dependence on their orientation relative to the device. Thus, although a library material may be processed by an optical bar code scanner only when the bar code label is properly positioned and readable by the scanner, a book having an RFID tag or combination tag may be positioned with front cover

either up or down, and without the need to carefully align a label with a scanner. This advantage of RFID systems over conventional optical and bar code systems results in considerable time savings for patrons and library staff. The "read range" may be different with different scanners, tags, and other components, but it is believed that a read range of approximately 15 centimeters (6 inches) would be satisfactory. To facilitate reliable RFID scanning, however, it may be desirable to position the RFID tags for various items at the same fixed position relative to an edge of the item. For example, RFID tags provided on library books might all be positioned 2 inches above the bottom of the book.

Detailed Description Text (55):
The benefits of the inventive RFID device are numerous and significant, and include having only a single station at which to identify, resensitize, and desensitize library materials, the elimination of operator training on and performance of different magnetization operations, increased processing speed due to the reduction of orientation constraints present in bar-code only systems, and decreased likelihood of repetitive stress injury to operators. Another benefit is that it is faster to scan RFID tags than to read a bar code, especially for codes that are inside the cover or case of the item, in large part because the user need not locate and align a bar code. Lastly, the system also is a low cost one because RFID readers are expected to cost less than high-performance bar-code scanners. These and other benefits and advantages will be apparent to one of skill in the art.

Detailed Description Text (57):
Another benefit of an RFID device is the ability to process multiple items at one time, as shown in FIG. 10. Whereas conventional devices having only optical bar code scanners can process only a single item presented to the bar code scanner at one time, a group of items having RFID elements may be processed essentially simultaneously. This may be achieved by having multiple RFID interrogation sources (readers) mounted in or on the device, or by having a single high-speed RFID reader that possesses the multi-item identification algorithms. This capability greatly reduces the time required for library staff to process multiple items.

Detailed Description Text (58):
To avoid having the device perform a magnetization operation that is inappropriate for one or more of a group of materials being processed, the device may be adapted to provide a message to the user requesting that all materials of a certain kind (books and magazines, for example) be presented together, followed by all materials of another kind (video and audio tapes, for example). The RFID reader can determine from the information obtained from individual RFID elements whether the user has segregated the materials appropriately, and can prompt the user if he or she has not, as shown in FIG. 12. In another embodiment, the device includes one area for processing media of one type (books and magazines, for example), and a separate area for processing media of another type (video and audio tapes, for example). The proper magnetization operation may then be reliably performed as to each material.

Detailed Description Text (59):
The device may also include a display for indicating how many items bearing RFID tags have been presented for processing by the device. That is, the RFID reader would obtain information from each item presented to the device, and update the display to indicate that there were, for example, five items present. An optical or other detector could also be used to verify that the same number of items were indeed present, so as to alert the patron or library staff if an item without an RFID tag had been inadvertently or intentionally included in the stack of other materials. Optical detectors of this type may include those described in U.S. patent application Ser. No. 09/058,585 (Belka et al.), filed Apr. 10, 1998 and entitled "Apparatus and Method for the Optical Detection of Multiple Items on a Platform," which is assigned to the assignee of the present invention, the contents of which is incorporated by reference herein. Other detectors may include ones based on weight (in which the RFID reader can determine from the RFID tag or the

LAV software the weight of the items detected, and compare it to the actual weight of the materials presented), or the number of magnetic elements detected (as described in U.S. Pat. No. 5,260,690 (Mann et al.), the contents of which is incorporated by reference herein). Comparison of the number of items detected by the RFID reader and the number detected by an optical or other detector insures that the magnetic security elements associated with non-RFID tagged items are not deactivated without the item also being charged out to a specific patron. The device may process the items after a predetermined number of items have been presented (four items, for example), or after an operator instructs the device to process the items, or automatically without any operator intervention. A suitable display may advise the operator as to the status of the operation.

Detailed Description Text (60):
Another embodiment of the inventive device is the ability to verify the content of a package or case having multiple items inside, as shown in FIG. 11. For example, a set of audio tapes may be packaged together inside a single case. To insure that only those tapes, and all of those tapes, are being processed together, the RFID reader can identify the case, and identify each of the tapes inside the case, and match the identities before permitting the materials to be checked out to a patron. The RFID tag on the case may include the information as to the contents of the case, or that information may be stored in the LAV software and accessed through the identification information obtained from the RFID tag.

Detailed Description Text (65):
The hand-held RFID device of the present invention preferably includes an RFID reader and writer, memory, a power source, and software to enable various functions of the types described herein. The RFID reader/writer could consist of a Commander 320 13.56 MHz RFID reader, manufactured by Texas Instruments of Dallas, Texas. Memory, preferably in the form of a computer, may be provided by, for example, a "palm-top" or handheld computer available from 3Com Company of Santa Clara, Calif. under the designation Palm Pilot. The portable computer may include an operating system, a touch-screen display, several buttons for developing user interfaces, a recharge station, a docking station to transfer data between the device and another computer, one or more ports to connect peripherals to the hand-held device (such as an RFID reader) and a battery power supply. Some units may also include a built-in peripheral such as a bar-code scanner. It may also contain various feedback systems, including lights, audio and a display.

Detailed Description Text (68):
A particularly useful embodiment of the hand-held RFID device is as follows. A hand-held RFID device is provided in which the RFID reader, user interface, power source, antenna, processor, and software are all provided in a single integrated unit, as shown in FIG. 13. By using a hand-held computer such as the Palm Pilot described above, a number of real-time functions of the type described below can be achieved, in contrast to systems in which the RFID device must interact with a separate computer, database, software system, and the like. The software can also provide either limited or full-range capabilities for supporting functions of the type described herein, as desired. The hand-held RFID device also preferably includes an integral power source, although it can be tethered to a larger power source of the type that might be worn around a user's waist. In the case of an integral power source, the source may or may not power the processor, and may be recharged when connected to a docking station. When a hand-held computer is used, it may include its own power source, and may be recharged when connected to the docking station to upload and/or download information, as shown in FIG. 14.

Detailed Description Text (69):
A hand-held RFID device can interrogate and identify RFID-tagged items whenever it is activated within range of the items. Intermittent activation can be provided by, for example, a trigger associated with the device, so that the elapsed time for which power is required for the RFID device is minimized. The reading distance is a

function of many factors, but is expected to be between 15 and 45 centimeters (6 and 18 inches) given current technology and the likely frequencies at which the system would operate. In some applications, it may be desirable to restrict the operating range of the device so that it only interrogates RFID tags associated with items at a closer range. In other cases, the longest available range of operation will be desired. In other applications, it may be preferred to restrict the output power (and thus the reading range) to permit longer continuous operation from the battery pack. The read range will also be influenced by the design of the antenna as well as the orientation of the RFID tag relative to the antenna. It should be appreciated that the read range, battery weight, and lifetime between battery recharges or replacement are often dependent on each other. Various tradeoffs can be envisioned, based on the particular application for the device.

Detailed Description Text (70):
In operation, a particularly useful feature of a hand-held device is obtaining real-time information regarding an item that has been scanned by the device. That is, the hand-held device obtains information from the RFID tag, and either immediately displays that information, or immediately displays information stored within the hand-held device that is related to the tagged item. This is in contrast to devices that must be docked with or otherwise communicate with a separate database of information before that information can be displayed for the user. The hand-held device of the present invention can also be docked or can otherwise communicate with a separate database, if such features are desired.

Detailed Description Text (74):
Another example is to locate items that have not circulated or been used within a given number of months. Again, the identifiers of those items could be downloaded to the hand-held device for searching. Alternatively, the circulation counts can be maintained directly on the memory of the RFID tag. In this case, the hand-held device does not need to download any data from another computer system. The hand-held device only compares RFID memory data to established criteria and provides feedback to the operator based on the selected parameters.

Detailed Description Text (75):
Another example of where data can be either downloaded from a library data base to the hand-held device or obtained directly from the RFID tag is to locate items in the library that have not been checked in. A list of items not checked-in could be obtained and then downloaded to the hand-held device or the RFID tag could maintain a memory location to indicate the check-in status of an item. When the RFID tag memory indicates the check-in status, the hand-held device does not need any data from an external database to perform the search. A natural application of obtaining matching data directly from the RFID tag is to locate items that belong to different library buildings or to different library systems. For this application, the owning library is preferably encoded onto the RFID tag and the hand-held device alerts the operator when an RFID tag with a different owning library code is encountered. The hand-held RFID device could also be used to determine, as with the RFID device described above, whether all members of a set of associated items are present together, as with the tapes in a books-on-tape case.

Detailed Description Text (77):
Another method of establishing shelf information is to associate each item with a location. Shelf locations can be as specific or as general as the library desires. For example, a general shelf location might include all "Adult Fiction titles." A more specific shelf location might be "Adult Fiction, Authors AA-AB." In the preferred embodiment, the shelf location for an item is encoded directly in the RFID tag memory for that item. An indexing system may also be used to save memory, so that a short code number is used to indicate a shelf location. For example, the number 1 could represent Adult Fiction, the number 2 could represent Juvenile Fiction, and so on. The amount of memory needed to store all shelf locations depends on the number of locations within a library. Another embodiment is to

obtain the desired shelf location from a library database and then download those locations as part of the transfer of data to the hand-held device.

Detailed Description Text (78):
When items are associated with a shelf location, by either method above, the operator can use the hand-held device to locate items that are in the wrong location. Two processing methods can be used to determine which shelf location is currently being processed in order to search for items with non-matching locations. In one embodiment, the correct shelf location is obtained by reading several RFID tags and heuristically processing the data to infer a location. For example, if the RFID device reads a certain number of tags that are indexed to the Adult fiction area, the device can be programmed to alert the user when non-Adult Fiction items are encountered. In another embodiment, the library places "location tags" on the shelves or other locations to be searched. These location tags are first read by the hand-held device to indicate that subsequent items read should belong to that location and an alert is provided when a mismatch occurs.

Detailed Description Text (80):
In yet another embodiment, the hand-held device could be used to provide additional information about a specific item once the item has been obtained and its RFID tag scanned by the RFID device. For example, library staff may collect materials that have been used in the library, and scan those materials either to obtain more information about that material (who last checked it out; how often has it been used) or to provide information to a database that generates statistical profiles of library material usage, or both. The operator simply reads the RFID tags of the items as they are collected from the various locations in the library at which they were used. As items are collected, the operator can also indicate from where the items were collected by selecting from a list of locations, entering a location code or reading a "location RFID Tag" that is associated with that location and would preferably be affixed to or near that location. In this way, the library staff is able to obtain additional information about where in the library such materials were used. Alternatively, if items used in the library are first placed on a book cart, for example, the hand-held device could make a single pass by the items on the cart to record them. The functions described in this paragraph are referred to herein as "sweeping."

CLAIMS:

1. A method of using a portable RFID device with a group of items each having an RFID tag, comprising the steps of:

(a) inputting information to the device describing a certain item or class of items;

(b) scanning the RFID tags associated with each item in the group of items;

(c) receiving signals from each of the scanned RFID tags; and

(d) comparing the received signals to the information input to the device to determine whether the certain item or class of items are present among the group of items.

9. The method of claim 7, wherein the indication is provided in response to information obtained from a database separate from the RFID device and the RFID tag.

19. A method of using an RFID device, comprising the steps of:

(a) interrogating a group of items each bearing an RFID tag;

(b) providing to the RFID device information identifying a certain class of items; and

(c) receiving in real time from the RFID device information identifying items that are not within the certain class of items.

21. A method of using an RFID device with items of interest that bear an RFID tag, comprising the steps of:

(a) interrogating a tagged item with the RFID device;

(b) entering information into the RFID device describing the location of the item of interest; and

(c) collecting in a database the information entered in step (b) regarding the item that was interrogated, wherein the database is separate from the RFID device, and the information is transferred to that database.

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L6: Entry 12 of 16 File: USPT Jan 29, 2002

DOCUMENT-IDENTIFIER: US 6342839 B1
TITLE: Method and apparatus for a livestock data collection and management system

Abstract Text (1):
An efficient method and apparatus for livestock data collection and management is described to provide quality assurance source verification data and performance tracking for individual animals throughout the production cycle. The preferred embodiment includes unique radio frequency identification (RFID) transponders for each animal; unique RFID transponders for animal events; default event data capability; a portable and wireless RFID reader to read the animal and event transponders; a multiple input/output device to accept the reader signals and livestock measurement data and to communicate by means of a wireless radio communication to a host computer; a feedback signal from the host computer to acknowledge receipt of data; BeefLink.TM. software to provide data gathering, storage, and query support, and a protocol converter to facilitate the transfer and sharing of data between different livestock databases.

Brief Summary Text (22):
Although electronic identification through radio frequency identification (RFID) tags or barcodes are used in some phases of the livestock production cycle, there is a need to provide a means for individual animal identification throughout the production cycle and to minimize the difficulty of data entry throughout the industry.

Brief Summary Text (23):
RFID Readers

Brief Summary Text (24):
Several RFID readers are commercially available, typically from the transponder suppliers, including models form Destron/Feating, Inc., Allflex USA, Inc. and Avid Marketing, Inc.

Brief Summary Text (25):
An object of the present invention is to provide an improved reader that supports the objectives of the livestock data collection and management system. The prior art includes RFID readers that can distinguish multiple types of RFID transponders as illustrated and described in U.S. Pat. No. 5,235,326, issued Aug. 10, 1993, "Multi-mode, identification system" to Michael L. Beigel, Nathaniel Polish, and Robert E. Malm.

Brief Summary Text (27):
The preferred flashlight shape permits a familiar and convenient object to be held by the user.

Brief Summary Text (32):
U.S. Pat. No. 5,322,034, which issued Jun. 21, 1994 to Richard L. Willham, for a "Livestock record system" describes a method for storing the individual animal's identification and performance data on a programmable electronic identification and data storage module carried with the animal. An object of the present invention is to provide a low-cost per animal system for obtaining and maintaining source

verification and performance databases that are independent of the animal.

Brief Summary Text (33):
U.S. Pat. No. 5,315,505 issued to William C. Pratt on May 24, 1994 for a "Method and system for providing animal health histories and tracking inventory of drugs" describes a method and system for providing improved drug treatment to selected animals in a retained group. A computer system is used to provide an operator with the health and drug treatment history of an animal. With this information and a diagnosis of the animal's health condition, a drug treatment is chosen. The diagnosis and treatment are entered into the computer system to update the animal's health and treatment history. An object of the present invention is to provide complete source verification and performance databases for all key livestock events.

Brief Summary Text (34):
U.S. Pat. No. 5,673,647 for a "Cattle management method and system", issued on Oct. 7, 1997 to William C. Pratt, describes an automated method and system for providing individual animal electronic identification, measurement and value based management of cattle in a large cattle feedlot. That method includes individual animal identification, a computer system, and multiple measurements coupled with a cattle handling and sorting system. An object of the Pratt patent was to build a feedlot data base to more accurately identify and measure characteristics such as weight, so that subsequent animals could be produced and fed for more effective value-based selection and management of the animals. In particular, that database related to calculations for economic management of feeding and shipping to permit optimum weight gains and feedlot ship dates. Whereas the feedlot patent disclosed identifying a particular animal on arrival at the feedlot, an object of the present invention is to track individual animals throughout the production cycle and to maintain performance and source verification data in the least disruptive manner to existing databases and management systems.

Brief Summary Text (36):
An object of the present invention is to provide an effective data collection and database management methodology in the livestock industry including automated entry for individual animal identification; automated entry events and of default values for events and data in the processing cycle; and effective communication and sharing of data between the various databases. One result of this data collection and management invention is that quality assurance source verification data for individual animals will be available throughout the production cycle. This source verification will include the ability to implement HACCP plans. The source verification provides an opportunity for enhanced product value through improved quality assurance and food safety.

Brief Summary Text (38):
The data collection and management capability is provided in a seamless and non-intrusive manner to all participants. The system encourages the collection and storage of data by putting the majority of the data collection and management process in the background, transparent to the user. Features of the present invention include automated data entry with useful default capabilities for common processing situations, feedback to confirm receipt of data, and the effective integration of multiple databases and inventory or management systems. As part of the production process, other entities, which are not usually in the chain of title to an animal, also have an interest in a portion of the data. Veterinarians can access the health history, nutritionists can access the feed and health history, and bankers can know the location of their collateral. An object of the present invention is to employ authorization levels to designate what information may be made available to these entities.

Brief Summary Text (41):
In accordance with the preferred embodiment of the present invention, a method and

apparatus for a livestock data collection and management system is described. The objectives of the present invention are to provide an efficient and cost-effective system and method of livestock data collection and data management that will provide quality assurance, HACCP compliance, and source verification data for individual animals throughout the production cycle. The resulting information will provide a basis for the producer, the stockman, the feedlot, and the packer to make informed herd management and operational decisions. Components of the data collection and management system in the preferred embodiment include unique Radio Frequency Identification (RFID) transponders for each animal; a RFID Reader that can identify the animal transponders; a data concentrator which collects information from multiple measurement equipment or output devices; RF event action tags to automate data entry, preset event data default capability, and data transfer between databases to eliminate duplicate data entry.

Drawing Description Text (5):
FIG. 3 is a schematic showing a wired connection between the RFID reader and a host computer.

Drawing Description Text (6):
FIG. 4 is a schematic showing a wireless radio frequency data communication (RFDC) connection between the RFID reader and a host computer.

Drawing Description Text (7):
FIG. 5 is a schematic showing a wireless radio frequency data communication (RFDC) connection to a multiple input/output data concentrator device located between the RFID reader and a host computer.

Drawing Description Text (11):
FIG. 9 is a schematic showing a wireless radio frequency data communication (RFDC) connection between the RFID reader and a host computer and additional livestock databases.

Drawing Description Text (12):
FIG. 10 is a schematic showing a cabled connection between the RFID reader and a data concentrator device and a wireless connection to a host computer and additional livestock databases.

Drawing Description Text (13):
FIG. 11 is a schematic showing a wireless radio frequency data communication (RFDC) connection between multiple RFID readers and a data concentrator device and a wireless connection to a host computer and additional livestock databases.

Detailed Description Text (5):
Referring now to FIG. 5, an animal is uniquely identified by means of a radio frequency identification (RFID) ear tag 32 or other type of transponder. The preferred identification is an RFID ear tag such as those provided by Destron/Fearing, Inc., Allflex USA, Inc, Avid Marketing, Inc. Alternately, the identification may be by means of an RFID implant, a rumen bolus, or a collar fitting on a neck or leg.

Detailed Description Text (6):
This RFID identification is typically applied to young animals at the first opportunity to pen and work the animals, such as at an initial immunization. The RFID identification, typically will have previously been applied to older breeding animals, and will typically remain with the animal until slaughter.

Detailed Description Text (7):
As the animal is typically restrained in a working chute, its identification may be determined by means of an RFID reader 30. This identification is accomplished by placing the reader near, typically within six inches, of an RFID ear tag or implant

transponder. The rumen bolus has a greater range. The preferred reader is described in more detail in an alternative embodiment described below.

Detailed Description Text (19):
Although a mechanical or other type of switch may be employed, the preferred method of operating the device is an infrared activation switch, which consists of an infrared light source 511 and an infrared reader 512 which will form a light circuit that can be broken by placing a thumb or a mechanical object in the space 513 between the light source and the reader. The mechanical object is desirable in some circumstances to leave the reader in an activated state while it is extended further into a working chute.

Detailed Description Text (26):
BeefLink is comprised of hardware and software to permit the user to scan radio frequency identification (RFID) ear tabs, implants collars, or boli with radio frequency identification scan readers; to enter new animals; to look up information on existing animals; to input new events; and to run queries on the work done. One objective of the software is to display pertinent data on each animal and add new events to the record in the least intrusive manner. The new animal records and events recorded are uploaded and incorporated into a larger database. Communication with the larger database allows the user to receive downstream animal performance data at his own computer.

Detailed Description Text (27):
The minimum components necessary to operate the system are as follows: a host computer which is an IBM-compatible desktop or laptop computer with Windows.TM.95 (or higher) operating system; 50 MHz 486 processor; 8 MB RAM; one serial port; 300 MB hard drive; 14.4 Kbps modem; 3.5" Floppy disk drive; external power supply; MS-Access.TM.97 database software; BeefLink.TM. data collection software; Hand-held RFID reader with an RS-232 output capability; a null modem cable (DB9F to DB9M) up to 50 feet between laptop and reader; and RFID transponders on each animal.

Detailed Description Text (35):
The RFID reader typically communicates either wirelessly or through a cable to the "Comm 1" serial port on the data concentrator unit. In some cases, the reader will be the only equipment used, and no equipment setup will be required. In some simpler applications, a data concentrator unit may not be used, and the reader may be connected directly to a computer port, or communicate in a wireless fashion to a radio receiver/transmitter which is connected directly to a computer port.

Detailed Description Text (36):
If equipment in addition to the RFID reader is used, it will be connected through a serial port on the Data Concentrator unit. The Data Concentrator unit has multiple serial ports, each of which is default labeled for specific types of equipment which is commonly used in the beef industry. The user simply plugs each device into the proper port on the Data Concentrator unit.

Detailed Description Text (44):
The RFID reader is always connected to port 1, and is used to read both animal ID tags and event tags. Its configuration cannot be changed. Port 2 is connected to an electronic weigh scale and is used to collect animal weights. Port 3 is configured for a digital thermometer and is used to collect body temperatures. Port 4 is connected to ultrasound equipment used to measure back fat. Port 5 is connected to a bar code scanner and is used for collecting the identity of drugs used as treatments. Port 6 is connected to a remote printer that prints labels for veterinary samples that are being collected.

Detailed Description Text (50):
To add or change an Action Tag associated with an event, the user first connects the RFID reader to Comm 1 of his Data Concentrator unit. The user then scans the

Action Tag, and the unique transponder number of the tag will appear in the first text box of the setup screen. The user can then select or type the new assigned event. The same procedure can be repeated for as many Action Tags as desired to link to new events and details.

Detailed Description Text (149):
With the RFID reader cabled or wireless radio cabled to Comm 1, the user is ready to start scanning animals.

Detailed Description Text (157):
If an animal loses its RFID tag the animal can be re-tagged, and an Action Tag with "RETAG" as the event can be used to replace the old tag references. The system can be used with visual ID tags and barcode tags, but RFID transponder ear tags are the preferred identification method.

Detailed Description Text (178):
FIG. 3 illustrates a simple embodiment of the BeefLink data collection software with an RFID reader 30, which was linked by cable 33 to a host computer 10. In this case, animal identification would be obtained from an RFID transponder 32, and Work Cards 31 where RFID event transponders are used to record events.

Detailed Description Text (184):
FIG. 4 illustrates a simple embodiment of the BeefLink data collection software with a radio frequency wireless connection 40 between the RFID reader 30 and the host computer 10. In this case, animal identification would be obtained from an RFID transponder 32, and Work Cards 31 with RFID event transponders are used to record events.

Detailed Description Text (190):
FIG. 9 illustrates this existing system or existing database communication in a wireless reader embodiment. The RFID reader 30 communicates through RFDC transmitter/receivers 36 and 71.

Detailed Description Text (194):
FIG. 11 illustrates a wireless reader configuration where the data concentrator 50 receives data from multiple RFID readers indicated by readers 30 and 45. This type of configuration is desirable in larger operations where there may be more than one livestock working area at a given time. In this case, a larger antenna 63 may be necessary at the data concentrator, and it may be desirable to have a keyboard 261 and monitor 262 connected to the data concentrator.

Detailed Description Text (197):
The preferred embodiment is a data collection and management system for beef cattle production as indicated by FIG. 12. The components of the data collection and management system in the preferred embodiment include unique Radio Frequency Identification (RFID) transponders for each animal; an Action Card of RFID transponders to identify livestock events, an RFID Reader that can identify the animal and event RFID transponders; a wireless RFDC communication between the reader and a data consolidator unit which has multiple ports for livestock measurement data,; a multi-ported data concentrator unit for connection to a scale, a thermometer, an ultrasound measurement device, and an output device, a wireless RFDC communication between the data concentrator unit and the host computer, BeefLink.TM. Data Collection Software; and database protocol converter communication and integration tools.

Detailed Description Text (198):
Radio Frequency Identification (RFID) Transponders

Detailed Description Text (199):
Although the data collection system can operate manually with visual animal

identification, the preferred operation is with Radio Frequency Identification (RFID) transponders 32 in the form of electronic ear tags, implants, boli or neck or leg collars to provide unique identification for each animal. Although ear tags and implants are the most common devices, a bolus transponder has been used successfully as a tamper-proof means of identification of cattle. The bolus transponder has the potential capability of measuring temperature and pH within the animal. The RFID transponders contain a small antenna attached to an integrated circuit that stores a unique identification number. Unlike bar codes, RFID transponders do not require line-of-sight to be read, the transponder simply needs to come into the proximity of an RFID reader.

Detailed Description Text (200):
RFID Reader

Detailed Description Text (201):
The RFID reader 30 will typically be stationary reader at high volume at the packer or feedlot operations and portable readers at the processing points. Stationary readers will be typically be connected to a host computer or data consolidator by means of a cable, but a wireless connection may also be used for stationary readers. The portable readers will typically use a wireless connection to the computer. The Readers emit a low radio frequency, typically a 134.2 kHz signal that excites the passive transponder in the event or animal identification tag. Once excited, the transponder responds back to the reader via radio frequency with a digital signal representing its unique identification. The reader decodes the signal, displays the identification, and sends the identification to the computer.

Detailed Description Text (203):
A Work Card 31 with RFID transponders 41, 42 and 43 provides livestock event identification so that events can be read by the RFID reader rather than entered by keyboard. The user may select one or more event cards for the anticipated work session. Other event tags may be more permanently affixed at other convenient locations in the work area, such as around the processing chute. The tags on the work card have the name or symbol label for the corresponding events so that the person working the cattle can quickly scan the appropriate event when it occurs.

Detailed Description Text (216):
In the preferred embodiment, the RFID tags, and visual identification tags are correlated so that at any point in the livestock cycle, historical data is available to any entity in the chain of title for the livestock.

CLAIMS:

38. The method of claim 31 comprising the additional steps:

identifying an animal with a visual identification code;

entering the visual identification code to the host computer such that animal event data may be accessed by the visual identification code.

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L8: Entry 1 of 2 File: USPT May 25, 2004

DOCUMENT-IDENTIFIER: US 6739511 B2
TITLE: METHOD OF SPECKLE-NOISE PATTERN REDUCTION AND APPARATUS THEREFOR BASED ON REDUCING THE TEMPORAL-COHERENCE OF THE PLANAR LASER ILLUMINATION BEAM BEFORE IT ILLUMINATES THE TARGET OBJECT BY APPLYING TEMPORAL PHASE MODULATION TECHNIQUES DURING THE TRANSMISSION OF THE PLIB TOWARDS THE TARGET

Brief Summary Text (312):
Another object of the present invention is to provide a Data-Element Queuing, Handling And Processing Subsystem for use in the PLIIM-based system, wherein object identity data element inputs (e.g. from a bar code symbol reader, RFID reader, or the like) and object attribute data element inputs (e.g. object dimensions, weight, x-ray analysis, neutron beam analysis, and the like) are supplied to a Data Element Queuing, Handling, Processing And Linking Mechanism contained therein via an I/O unit so as to generate as output, for each object identity data element supplied as input, a combined data element comprising an object identity data element, and one or more object attribute data elements (e.g. object dimensions, object weight, x-ray analysis, neutron beam analysis, etc.) collected by the I/O unit of the system.

Brief Summary Text (315):
Another object of the present invention is to provide such an Object Identification And Attribute Information Tracking And Linking Computer having a programmable data element queuing, handling and processing and linking subsystem, wherein each object identification data input (e.g. from a bar code reader or RFID reader) is automatically attached to each corresponding object attribute data input (e.g. object profile characteristics and dimensions, weight, X-ray images, etc.) generated in the system in which the computer is installed.

Brief Summary Text (316):
Another object of the present invention is to provide such an Object Identification And Attribute Information Tracking And Linking Computer System, realized as a compact computing/network communications device having a set of comprises: a housing of compact construction; a computing platform including a microprocessor, system bus, an associated memory architecture (e.g. hard-drive, RAM, ROM and cache memory), and operating system software, networking software, etc.; a LCD display panel mounted within the wall of the housing, and interfaced with the system bus by interface drivers; a membrane-type keypad also mounted within the wall of the housing below the LCD panel, and interfaced with the system bus by interface drivers; a network controller card operably connected to the microprocessor by way of interface drivers, for supporting high-speed data communications using any one or more networking protocols (e.g. Ethernet, Firewire, USB, etc.); a first set of data input port connectors mounted on the exterior of the housing, and configurable to receive "object identity" data from an object identification device (e.g. a bar code reader and/or an RFID reader) using a networking protocol such as Ethernet; a second set of the data input port connectors mounted on the exterior of the housing, and configurable to receive "object attribute" data from external data generating sources (e.g. an LDIP Subsystem, a PLIIM-based imager, an x-ray scanner, a neutron beam scanner, MRI scanner and/or a QRA scanner) using a networking protocol such as Ethernet; a network connection port for establishing a network connection between the network controller and the communication medium to which the

Object Identification And Attribute Information Tracking And Linking Computer System is connected; data element queuing, handling, processing and linking software stored of the hard-drive, for enabling the automatic queuing, handling, processing, linking and transporting of object identification (ID) and object attribute data elements generated within the network and/or system, to a designated database for storage and subsequent analysis; and a networking hub (e.g. Ethernet hub) operably connected to the first and second sets of data input port connectors, the network connection port, and also the network controller card, so that all networking devices connected through the networking hub can send and receive data packets and support high-speed digital data communications.

Brief Summary Text (317):
Another object of the present invention is to provide such an Object Identification And Attribute Information Tracking And Linking Computer which can be programmed to receive two different streams of data input, namely: (i) passenger identification data input (e.g. from a bar code reader or RFID reader) used at the passenger check-in and screening station; and (ii) corresponding passenger attribute data input (e.g. passenger profile characteristics and dimensions, weight, X-ray images, etc.) generated at the passenger check-in and screening station, and wherein each passenger attribute data input is automatically attached to each corresponding passenger identification data element input, so as to produce a composite linked output data element comprising the passenger identification data element symbolically linked to corresponding passenger attribute data elements received at the system.

Brief Summary Text (318):
Another object of the present invention is to provide a Data Element Queuing, Handling, Processing And Linking Mechanism which automatically receives object identity data element inputs (e.g. from a bar code symbol reader, RFID-tag reader, or the like) and object attribute data element inputs (e.g. object dimensions, object weight, x-ray images, Pulsed Fast Neutron Analysis (PFNA) image data captured by a PFNA scanner by Ancore, and QRA image data captured by a QRA scanner by Quantum Magnetics, Inc.), and automatically generates as output, for each object identity data element supplied as input, a combined data element comprising (i) an object identity data element, and (ii) one or more object attribute data elements (e.g. object dimensions, object weight, x-ray analysis, neutron beam analysis, etc.) collected and supplied to the data element queuing, handling and processing subsystem.

Drawing Description Text (284):
FIG. 10A is schematic representation of the Data-Element Queuing, Handling And Processing (Q, H & P) Subsystem employed in the PLIIM-based system of FIG. 10, illustrating that object identity data element inputs (e.g. from a bar code symbol reader, RFID reader, or the like) and object attribute data element inputs (e.g. object dimensions, weight, x-ray analysis, neutron beam analysis, and the like) are supplied to the Data Element Queuing, Handling, Processing And Linking Mechanism via the I/O unit so as to generate as output, for each object identity data element supplied as input, a combined data element comprising an object identity data element, and one or more object attribute data elements (e.g. object dimensions, object weight, x-ray analysis, neutron beam analysis, etc.) collected by the I/O unit of the system;

Drawing Description Text (318):
FIG. 25A is schematic representation of the Data-Element Queuing, Handling And Processing (Q, H & P) Subsystem employed in the PLIIM-based system of FIG. 25, illustrating that object identity data element inputs (e.g. from a bar code symbol reader, RFID reader, or the like) and object attribute data element inputs (e.g. object dimensions, weight, x-ray analysis, neutron beam analysis, and the like) are supplied to the Data Element Queuing, Handling, Processing And Linking Mechanism via the I/O unit so as to generate as output, for each object identity data element

supplied as input, a combined data element comprising an object identity data element, and one or more object attribute data elements (e.g. object dimensions, object weight, x-ray analysis, neutron beam analysis, etc.) collected by the I/O unit of the system;

Drawing Description Text (456):
FIG. 68C3 is a schematic block representation of the Object Identification And Attribute Information Tracking And Linking Computer of FIG. 68C1, showing its input and output unit and its programmable data element queuing, handling and processing and linking subsystem, and illustrating, in the passenger screening application of FIG. 68A, that each passenger identification data input (e.g. from a bar code reader or RFID reader) is automatically attached to each corresponding passenger attribute data input (e.g. passenger profile characteristics and dimensions, weight, X-ray images, etc.) generated at the passenger check-in and screening station;

Drawing Description Text (457):
FIG. 68C4 a schematic block representation of the Data Element Queuing, Handling, and Processing Subsystem employed in the Object Identification and Attribute Acquisition System at the baggage screening station in FIG. 68A, showing its input and output unit and its programmable data element queuing, handling and processing and linking subsystem, and illustrating, in the baggage screening application of FIG. 68A, that each baggage identification data input (e.g. from a bar code reader or RFID reader) is automatically attached to each corresponding baggage attribute data input (e.g. baggage profile characteristics and dimensions, weight, X-ray images, PFNA images, QRA images, etc.) generated at the baggage screening station (s) provided along the baggage handling system;

Detailed Description Text (540):
As shown in FIG. 10, the unitary system 120 of the present invention comprises an integration of subsystems, contained within a single housing of compact construction supported above the conveyor belt of a high-speed conveyor subsystem 121, by way of a support frame or like structure. In the illustrative embodiment, the conveyor subsystem 121 has a conveyor belt width of at least 48 inches to support one or more package transport lanes along the conveyor belt. As shown in FIG. 10, the unitary system comprises four primary subsystem components, namely: (1) a LADAR-based package imaging, detecting and dimensioning subsystem 122 capable of collecting range data from objects on the conveyor belt using a pair of amplitude-modulated (AM) multi-wavelength (i.e. containing visible and IR spectral components) laser scanning beams projected at different angular spacings as taught in copending U.S. application Ser. No. 09/327,756 filed Jun. 7, 1999, supra, and International PCT Application No. PCT/US00/15624 filed Jun. 7, 2000, incorporated herein by reference, and now published as WIPO Publication No. WO 00/75856 A1, on Dec. 14, 2000; (2) a PLIIM-based bar code symbol reading (i.e. object identification) subsystem 25', as shown in FIGS. 3E4 through 3E8, for producing a 3-D scanning volume above the conveyor belt, for scanning bar codes on packages transported therealong; (3) an input/output subsystem 127 for managing the data inputs to and data outputs from the unitary system, including data inputs from subsystem 25'; (4) a data management computer 129 with a graphical user interface (GUI) 130, for realizing a data element queuing, handling and processing subsystem 131, as well as other data and system management functions; and (5) and a network controller 132, operably connected to the I/O subsystem 127, for connecting the system 120 to the local area network (LAN) associated with the tunnel-based system, as well as other packet-based data communication networks supporting various network protocols (e.g. Ethernet, IP, etc). Also, the network communication controller 132 enables the unitary system to receive, using Ethernet or like networking protocols, data inputs from a number of package-attribute input devices including, for example: weighing-in-motion subsystem 132, shown in FIG. 10 for weighing packages as they are transported along the conveyor belt; an RFID-tag reading (i.e. object identification) subsystem for reading RF tags on packages as

they are transported along the conveyor belt; an externally mounted belt tachometer for measuring the instant velocity of the belt and package transported therealong; and various "object attribute" data producing subsystems, such as airport x-ray scanning systems, cargo x-ray scanners, PFNA-based explosive detection systems (EDS), Quadrupole Resonance Analysis (QRA) based or MRI-based screening systems for screening/analyzing the interior of objects to detect the presence of contraband, explosive material, biological warfare agents, chemical warfare agents, and/or dangerous or security threatening devices.

Detailed Description Text (550):
In FIG. 10A, the Data-Element Queuing, Handling And Processing (QHP) Subsystem 131 employed in the PLIIM-based Object Identification and Attribute Acquisition System of FIG. 10, is illustrated in greater detail. As shown, the data element QHP subsystem 131 comprises a Data Element Queuing, Handling, Processing And Linking Mechanism 2600 which automatically receives object identity data element inputs 2601 (e.g. from a bar code symbol reader, RFID-tag reader, or the like) and object attribute data element inputs 2602 (e.g. object dimensions, object weight, x-ray images, Pulsed Fast Neutron Analysis (PFNA) image data captured by a PFNA scanner by Ancore, and QRA image data captured by a QRA scanner by Quantum Magnetics, Inc.) from the I/O unit 127, as shown in FIG. 10.

Detailed Description Text (559):
In FIG. 68C4, the Object Identification And Attribute Acquisition System 120 of the illustrative embodiment is shown used to automatically link (i) baggage identification information (i.e. collected by either a image-based bar code reader or an RFID-tag reader) with (ii) baggage attribute information (i.e. collected by an x-ray scanner, a PFNA scanner, QRA scanner or the like). In this application, the Data Element Queuing, Handling And Processing Subsystem 131 is programmed to receive two different streams of data input at its I/O unit 127, namely: (i) baggage identification data input (e.g. from a bar code reader or RFID reader) used at the baggage check-in or screening station of the airport security screening system shown in FIG. 68; and (ii) corresponding baggage attribute data input (e.g. baggage profile characteristics and dimensions, weight, X-ray images, PFNA images, QRA images, etc.) generated at the baggage check-in and screening station.

Detailed Description Text (563):
According to this alternative embodiment shown in FIGS. 68C1 and 68C2, the Object Identification And Attribute Information Tracking And Linking Computer System 2639 is realized as a compact computing/network communications device having a set of comprises a number of: a housing 3000 of compact construction; a computing platform including a microprocessor (e.g. 800 MHz Celeron processor from Intel) 3001, system bus 3002, an associated memory architecture (e.g. hard-drive 3003, RAM 3004, ROM 3005 and cache memory), and operating system software (e.g. Microsoft NT OS), networking software, etc. 3006; a LCD display panel 3007 mounted within the wall of the housing, and interfaced with the system bus 3002 by interface drivers 3008; a membrane-type keypad 3009 also mounted within the wall of the housing below the LCD panel, and interfaced with the system bus 3002 by interface drivers 3010; a network controller card 3011 operably connected to the microprocessor 3001 by way of interface drivers 3012, for supporting high-speed data communications using any one or more networking protocols (e.g. Ethernet, Firewire, USB, etc.); a first set of data input port connectors 3013 mounted on the exterior of the housing 3000, and configurable to receive "object identity" data input from an object identification device (e.g. a bar code reader and/or an RFID reader) using a networking protocol such as Ethernet; a second set of the data input port connectors 3014 mounted on the exterior of the housing 3000, and configurable to receive "object attribute" data input from external data generating sources (e.g. an LDIP Subsystem 131, a PLIIM-based imager 25', an x-ray scanner, a neutron beam scanner, MRI scanner and/or a QRA scanner) using a networking protocol such as Ethernet; a network connection port 3015 for establishing a network connection between the network controller 3011 and the communication medium to which the Object Identification And

Attribute Information Tracking And Linking Computer System is connected; data element queuing, handling, processing and linking software 3016 stored on the hard-drive, for enabling the automatic queuing, handling, processing, linking and transporting of object identification (ID) and object attribute data elements generated within the network and/or system, to a designated database for storage and subsequent analysis; and a networking hub 3017 (e.g. Ethernet hub) operably connected to the first and second sets of data input port connectors 3013 and 3014, the network connection port 3015, and also the network controller card 3011, as shown in FIG. 68C2, so that all networking devices connected through the networking hub 3017 can send and receive data packets and support high-speed digital data communications.

Detailed Description Text (564):
As illustrated in FIG. 68C3, the Object Identification And Attribute Information Tracking And Linking Computer 2639 employed in the system of FIG. 68C1 is programmed to receive at its I/O unit 127 two different streams of data input, namely: (i) passenger identification data input 3020 (e.g. from a bar code reader or RFID reader) used at the passenger check-in and screening station; and (ii) corresponding passenger attribute data input 3021 (e.g. passenger profile characteristics and dimensions, weight, X-ray images, etc.) generated at the passenger check-in and screening station. During operation, each passenger attribute data input is automatically attached to each corresponding passenger identification data element input, so as to produce a composite linked output data element 3022 comprising the passenger identification data element symbolically linked to corresponding passenger attribute data elements received at the system. In turn, the composite linked output data element is automatically transported to a database for storage for subsequent processing, or to a data processor for immediate processing.

Detailed Description Text (571):
At the second (i.e. middle) level of the tree structure in FIG. 10B, the systems configuration manager presents a set of questions to the systems configuration engineer inquiring whether how objection identification will be carried out in the system or network. As shown at Block B in FIG. 10C, this can be achieved by presenting a GUI display screen asking the following question, and providing a list of answers which correspond to the capabilities realizable by the software and hardware libraries on hand: "What kind of object identification capability will the configured system employ (i.e. one employing "flying-spot" laser scanning techniques, image capture and processing techniques, and/or radio-frequency identification (RFID) techniques)?"

Detailed Description Text (682):
Notably, network communication controller 132 also enables the unitary system 140 to receive, using Ethernet or like networking protocols, data inputs from a number of object attribute input devices including, for example: a weighing-in-motion subsystem 132, as shown in FIG. 10, for weighing packages as they are transported along the conveyor belt; an RFID-tag reading (i.e. object identification) subsystem for reading RF tags on objects and identifying the same as such objects are transported along the conveyor belt; an externally-mounted belt tachometer for measuring the instant velocity of the belt and objects transported therealong; and various other types of "object attribute" data producing subsystems such as, as for example, but not limited to: airport x-ray scanning systems; cargo x-ray scanners; PFNA-based explosive detection systems (EDS); and Quadrupole Resonance Analysis (QRA) based and/or MRI-based screening systems for screening/analyzing the interior of objects to detect the presence of contraband, explosive material, biological warfare agents, chemical warfare agents, and/or dangerous or security threatening devices.

Detailed Description Text (690):
In FIG. 25A, the Data-Element Queuing, Handling And Processing (QHP) Subsystem 131

employed in the PLIIM-based Object Identification and Attribute Acquisition System 140 of FIG. 25, is illustrated in greater detail. As shown, the data element QHP subsystem 131 comprises a Data Element Queuing, Handling, Processing And Linking Mechanism 2610 which automatically receives object identity data element inputs 2611 (e.g. from a bar code symbol reader, RFID-tag reader, or the like) and object attribute data element inputs 2612 (e.g. object dimensions, object weight, x-ray images, Pulsed Fast Neutron Analysis (PFNA) image data captured by a PFNA scanner by Ancore, and QRA image data captured by a QRA scanner by Quantum Magnetics, Inc.) from the I/O unit 127, as shown in FIG. 25.

Detailed Description Text (700):
At the second (i.e. middle) level of the tree structure in FIG. 25B, the systems configuration manager presents a set of questions to the systems configuration engineer inquiring whether how objection identification will be carried out in the system or network. As shown at Block B in FIG. 10C, this can be achieved by presenting a GUI display screen asking the following question, and providing a list of answers which correspond to the capabilities realizable by the software and hardware libraries on hand: "What kind of object identification capability will the configured system employ (i.e. one employing "flying-spot" laser scanning techniques, image capture and processing techniques, and/or radio-frequency identification (RFID) techniques)?"

Detailed Description Text (742):
Interactions between the remote network management system (NMS) 2622, referred to as the RMCS management console, and managed devices in the tunnel-based LAN 2621, can be any of the four different types of commands: (1) READS--commands used for monitoring managed devices, by the NMS reading variables maintained within the MIB of the managed devices; (2) WRITES--commands used for controlling managed devices, by the NMS writing variables stored within the MIB of managed devices; (3) TRANSVERSAL OPERATIONS--commands used NMSs to determine which variables a managed device supports and to sequentially gather information from variable tables (e.g. IP routing tables) in the managed devices; and (4) TRAPS--commands used by managed devices to asynchronously report certain events to the NMS.

Detailed Description Text (748):
As shown in FIG. 30C, the network configuration parameters for each tunnel-based LAN 2621 might typically include, for example: router IP address; the number of nodes (i.e. systems) in LAN; passwords, and LAN location; name of customer facility; name of technical contact; the phone number of the technical contact; the domain name assigned to the LAN; the object identity (i.e. identification) codes (OIC) assigned to subsystems (e.g. bar code readers and RFID readers) within the tunnel-based system capable of identifying objects, and inherited by the systems and networks employing said subsystems; object attribute acquisition codes (OAAC) assigned to subsystems within systems and networks, capable of acquiring object attributes (e.g. by either generation or collection processes) and object attribute data producing devices (e.g. X-ray scanners, PFNA scanners, QRA scanners, and the like).

Detailed Description Text (1016):
Second Illustrative Embodiment of the Airport Security System of the Present Invention Including (i) Passenger Check-In Stations Employing Biometric-Based Passenger Identification Subsystems, (ii) Baggage Check-In Stations Employing Baggage Identification and Attribute Acquisition Subsystems Cooperating with X-Ray Baggage Scanning Subsystems and RFID Tag Readers, and (iii) an Internetworked Passenger and Baggage RDBMS

Detailed Description Text (1022):
As shown in FIG. 69A, the baggage screening station 2691 comprises: an X-radiation baggage scanning subsystem 2650; a conveyor belt structure 2651; and a package identification and attribute acquisition system 120A and an RDIF-tag based object

identification device 2693 mounted above the conveyor belt structure 2651, before the entry port of the X-radiation baggage scanning subsystem 2650 (or physically and electrically integrated therein), for automatically performing the following set of functions: (i) identifying each article of baggage 2643 by reading the baggage identification (BID) bar code symbol 2642 applied thereto at the baggage screening station 2691; (ii) dimensioning (i.e. profiling) the article of baggage and generating baggage profile information; (iii) capturing a digital image of the article of baggage; (iv) indexing such baggage attribute data with the corresponding BID number encoded either into the scanned BID-encoded bar code symbol or the scanned BID-encoded RFID-tag applied to each article of baggage; and (v) sending such BID-indexed baggage attribute data elements to the passenger and baggage attribute RDBMS 2633 for storage as a baggage attribute record, as illustrated in FIG. 68B. Notably, subsystem 120A (which receives RFID-tag reader input) performs a "baggage identify tagging" function, wherein each baggage attribute data element is automatically tagged with the baggage identification so that the package attribute data can be stored in the RDBMS 2633 in a way that is related in the RDBMS to other baggage articles and the corresponding passenger carrying the same on board a particular scheduled flight. As shown, the baggage screening subsystem 2691 further comprises a PFNA, MRI and QRA scanning subsystem 2660 installed slightly downstream from the x-ray scanner 2650, with an object identification and attribute acquisition subsystem 120B integrated therein, for automatically scanning each BID bar coded article of baggage prior to screening, and producing visible digital images corresponding to the interior and contents of each baggage article using either PFNA, MRI and/or QRA well known in the bagging screening arts. Such scanning subsystems 2660 can be used to detect the presence of explosive materials, biological weapons (e.g. Anthrax spores), chemical agents, and the like within articles of baggage screened by the subsystem. Baggage screening station 2691 may also include a TEDS integrated into the system.

Detailed Description Text (1023):
As shown in FIG. 69A, the system further comprises a hand-held RFID-tag reader 2695 with a LCD panel 2695A, keypad 2695B, and a RF interface 2695C providing a wireless communication link to a mobile base station 2696, comprising an RF transmitter 2696A and server 2696B which is operably connected to the LAN in which the RDBMS 2633 is connected. The function of the hand-held REID-tag reader 2695 is to receive instructions from the Data Processing Subsystem 2634 about the identity and attributes of a suspect passenger and/or articles of baggage, and to use the RFID-tag reader 2695 to determine exactly where the baggage resides in the event of there being a need to access the baggage article and remove it from the baggage handling system or aircraft. During operation, the hand-held RFID-tag reader 2695 generates a RF-based interrogation field which interrogates the whereabouts of a particular BID-encoded RFID-tag 2697 (on an article of baggage). This interrogation process is achieved by generating and locally broadcasting a set of RF-harmonic frequencies (from the RFID-tag reader 2697) which correspond to the natural resonant frequencies of the RF-tuned circuits used to create the BID-encoded structure underlying the RFID-tag. When the suspect baggage resides within the interrogation field of the hand-held RFID-tag reader 2695, an audible and/or visual alarm is signaled from the reader, causing the operator to take immediate action and retrieve the RFID-tag article of baggage from either the baggage handling system or a particular aircraft or other vehicle. Also, the LCD panel of the RFID-tag reader 2696 can access and display other types of attribute information maintained in the RDBMS 2633 about the suspect article of baggage.

Detailed Description Text (1040):
The primary advantages of the airport security system and method of present invention is that it enables passenger and baggage attribute information collected by the system to be further processed after a particular passenger and baggage article has been checked in, using automated information analyzing agents and remote intelligence RDBMS 2670. The digital images and facial profiles collected from each checked-in passenger can be compared against passenger attribute

information records previously stored in the RDBMS 2633. Such information processing can be useful in identifying first-time passengers, as well as passengers who are trying to falsify their identity to gain passage aboard a particular flight. Also, in the event that subsequent analysis of baggage attributes reveal a security breach, the digital image and profile information of the particular article of baggage, in addition to its BID number, will be useful in finding and locating the baggage article aboard the aircraft using the mobile RFID-tag reader 2695, in the event that this is necessary. The intelligent image and information processing algorithms carried out by Data Processing Subsystem 2634 are within the knowledge of those skilled in the art to which the present invention pertains.

Detailed Description Text (1044):
Optionally, a RFID-tag reader 2706 is installed at the entry port of the tunnel-like housing in order to automatically read RFID-tags applied to objects being x-ray scanned through the system. The output data port of the RFID-tag reader 2706 is operably connected to the object identity data input port provided on the object identification and attribute acquisition subsystem 120. As such, the object identification and attribute acquisition subsystem 120 is adapted to receive two different sources of object identification information from objects being transported through the x-ray scanning machine 2701, namely bar code symbol based object identity information, and RFID-tag based object identify information. As shown, the Ethernet data communications port of the object identification and attribute acquisition subsystem 120 is connected to the local network (LAN) or wide area network (WAN) 2708 via suitable communications cable, medium or link. In turn, the LAN or WAN 2708 is connected to the infrastructure of the Internet 2709 to which one or more remote intelligence RDBMSs 2710 are operably connected using the TCP/IP protocol.

Detailed Description Text (1048):
Optionally, a RFID-tag reader 2726 is installed at the entry port of the tunnel-like housing in order to automatically read RFID-tags applied to objects being x-ray scanned through the system. The output data port of the RFID-tag reader 2726 is operably connected to the object identity data input port provided on the object identification and attribute acquisition subsystem 120. As such, the object identification and attribute acquisition subsystem 120 is adapted to receive two different sources of object identification information from objects being transported through the x-ray scanning machine 2721, namely bar code symbol based object identity information, and RFID-tag based object identify information. As shown, the Ethernet data communications port of the object identification and attribute acquisition subsystem 120 is connected to the local network (LAN) or wide area network (WAN) via suitable communications cable, medium or link. In turn, the LAN or WAN 2729 is connected to the infrastructure of the Internet 2730 to which one or more remote intelligence RDBMSs 2731 are operably connected using the TCP/IP protocol. This arrangement enables the object identification and attribute subsystem 120 to transport linked object identification and attribute data elements to any RDBMS 2731 to which it is networked, for storage and subsequent processing in diverse applications. Object identification and attribute data elements linked by and transported from the object identification and attribute acquisition subsystem 120 can be used in diverse types of intelligence and security related applications.

Detailed Description Text (1051):
Optionally, a RFID-tag reader 2746 is installed at the entry port of the tunnel-like housing in order to automatically read RFID-tags applied to objects being QRA scanned through the system. The output data port of the RFID-tag reader 2746 is operably connected to the object identity data input port provided on the object identification and attribute acquisition subsystem 120. As such, the object identification and attribute acquisition subsystem 120 is adapted to receive two different sources of object identification information from objects being

transported through the QRA scanning machine 2741, namely bar code symbol based object identity information, and RFID-tag based object identify information. As shown, the Ethernet data communications port of the object identification and attribute acquisition subsystem 120 is connected to the local network (LAN) or wide area network (WAN) 2748 via suitable communications cable, medium or link. In turn, the LAN or WAN 2748 is connected to the infrastructure of the Internet 2749 to which one or more remote intelligence RDBMSs 2750 are operably connected using the TCP/IP protocol. This arrangement enables the object identification and attribute subsystem 120 to transport linked object identification and attribute data elements to any RDBMS 2750 to which it is networked, for storage and subsequent processing in diverse applications. Object identification and attribute data elements linked by and transported from the object identification and attribute acquisition subsystem 120 can be feature in diverse types of intelligence and security related applications.

Detailed Description Text (1054):
Optionally, a RFID-tag reader 2764 is installed on the scanning arm in order to automatically read RFID-tags applied to objects being QRA scanned through the system. The output data port of the RFID-tag reader 2764 is operably connected to the object identity data input port provided on the object identification and attribute acquisition subsystem 120A. As such, the object identification and attribute acquisition subsystem 120A is adapted to receive two different sources of object identification information from objects being transported through the QRA scanning machine 2761, namely bar code symbol based object identity information, and RFID-tag based object identify information from the RFID-tag reader 2764. As shown, the Ethernet data communications port of the object identification and attribute acquisition subsystem 120B is connected to the local network (LAN) or wide area network (WAN) 2768 via suitable communications cable, medium or link. In turn, the LAN or WAN 2768 is connected to the infrastructure of the Internet 2769 to which one or more remote intelligence RDBMSs 2770 are operably connected using the TCP/IP protocol. This arrangement enables the object identification and attribute subsystem 120B to transport linked object identification and attribute data elements to any RDBMS 2770 to which it is networked, for storage and subsequent processing in diverse applications. Object identification and attribute data elements linked by and transported from object identification and attribute acquisition subsystems 120A, 120B can be used in diverse types of intelligence and security related applications.

Detailed Description Text (1098):
It is understood that in certain cases, some or every vehicle passing through the system of FIG. 82 may carry an RFID-tag 2931, and thus an RFID-tag reader 2932 can be mounted on the support structure 2922 of the AVC system, with its output port being connected to an object identification data input port provided on one of the PLIIM-based subsystems 120 employed in the system. This will enable the system to identify vehicles based on the code embodied within their RFID-tags.

Detailed Description Text (1103):
It is understood that in certain cases, some or every vehicle passing through the system of FIG. 83 may carry an RFID-tag, and thus an RFID-tag reader can be mounted on the support structure 2932 of the system, with its output port being connected to an object identification data input port provided on one of the PLIIM-based subsystems 120 employed in the system. This will enable the system to identify vehicles based on the code embodied within their RFID-tags.

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L6: Entry 1 of 2 File: USPT Mar 16, 2004

DOCUMENT-IDENTIFIER: US 6707381 B1
TITLE: Object tracking method and system with object identification and verification

Brief Summary Text (6):
While object tracking systems and methodologies disclosed in these and other references have proven extremely valuable in the tracking and control of objects such as keys, they nevertheless exhibit significant limitations and weaknesses in some applications. One primary weakness common to prior object tracking systems is that they don't track the actual objects that are being controlled, e.g. keys themselves. Rather, they track a container or tag that is attached to or carries the object and that is provided with an electronic or optical identification code. This opens the possibility for the object that is actually being tracked to be removed from its tag or container or swapped with a worthless object without the system identifying the security breach. For example, a key to a vehicle can be cut off of its ID tag or stripped from its container and a traditional electronic key tracking system will not detect the theft of the key. Similarly, if narcotics within ID containers are being tracked, the pills themselves can be removed from their containers and confiscated and the tracking system is none the wiser.

Brief Summary Text (13):
Each security container is provided with an identification code, which may be in the form of an optical bar code or an electronic code stored in a chip or RFID tag on the container. The system is provided with a reader, which may be an optical reader, a contact memory reader, or a radio frequency identification (RFID) reader, that reads the ID code of the security containers upon check-out and check-in to identify each container. In some respects, the system is similar to that disclosed in the Hambrick et al. patent. However, Hambrick et al. discloses only the reading of an optical bar code on an object container when the container is checked in to the system. No detection of the object itself is done and no reading at all is done upon check-out by a user. Thus, if a container drops from its storage bin or is taken from the storage cabinet after having been checked in, the Hambrick et al. system has no way to detect this event.

Detailed Description Text (2):
Referring now to the drawing figures, in which like reference numerals refer to like parts throughout the several views, FIG. 1 illustrates one possible configuration of an object control system that may be used to carry out the method of the present invention. The system includes a secure lockable enclosure in the form of a cabinet 11 for containing the various components of the system and for storing and securing objects to be tracked and controlled. The cabinet is provided with a set of wheels or casters for moving the cabinet easily to a remote location, where the system may be operated in a mobile or stand-alone mode if desired. The cabinet has a front face 12 and contains, among other things, a control computer 13. The control computer 13 is provided with a user interface, which includes a display screen 14, a keyboard or keypad 16 for entry of information, a user identification reader 17, and a card swipe reader 15. The display screen 14 may take the form of a touch screen if desired so that users may enter information into the control computer by touching virtual buttons on the screen. The user identification reader 17 and card swipe reader 15 are provided for verifying the

identity of a user. The reader 17 may comprise, for example, an ID fob reader, an RFID tag reader, or a biometrics detector such as a finger print reader, retina scanner, facial feature scanner, thermal imaging scanner, etc. The cabinet is provided with a lock 30 for securing the cabinet in its closed condition.

Detailed Description Text (6):
An RFID tag 41 and associated RF antenna 42 are provided on or embedded within a wall of the container so that the container can be identified by the system when checked in or out as detailed below. While an RFID tag is preferred for this purpose, container identification also may be provided in a variety of other ways such as, for example, via optical bar code, contact memory device, or otherwise. With respect to the operation of RFID tags and readers, reference is made to the disclosure of my U.S. Pat. No. 6,204,764, which is hereby incorporated by reference. The security container 31 preferably is made at least partially of a transparent or translucent material to provide for visual inspection of objects in the container and to facilitate the object identification and verification functions of the method of this invention, which are discussed in more detail below.

Detailed Description Text (12):
FIG. 4 illustrates additional elements of the system for carrying out the method of this invention. Here, as in FIG. 3, a security container 31 is shown stationed on the platform 49 of the scales 48, where it is located just after check-in by a user or just before being dispensed to a user who has requested an object in the container. An RFID tag reader 56 is positioned in the cabinet beside the scale platform 49 and is adapted to read the unique ID code stored in the RFID tag by radio transmission, as described in the incorporated '764 patent. This ID code is communicated from the RFID reader to the control computer, which compares the code to a look-up table to identify positively the particular container stationed on the scale platform.

Detailed Description Text (20):
Once on the scale, the security container is interrogated. First, the RFID tag of the security container is interrogated with the RFID tag reader located adjacent the container to identify the security container itself. A table look-up is conducted by the control computer to log the container in and to determine various information about the container such as, for instance, the identity of the object or objects expected to be contained therein, the weight of the container and its contents at the time it was checked out, and the file location of the digital image of the container that was made when the container was checked out and/or the features derived therefrom. After determining such information about the container, the weight of the container and its contents is noted by the control computer by reading the digital scales on which the container sits. The scales communicate the weight of the security container to the control computer through a standard data communications protocol such as, for instance, through RS232 communications link. This weight is compared to the weight of the container as measured when the container was checked out of the system in order to confirm that the check-in weight is what it is expected to be. For example, where the container contains keys to vehicles, the measured weight should be equal to the weight noted at check-out. If it is not, then tampering, key substitution, a theft, or another inappropriate activity is indicated. In such a situation, the control computer is programmed to take appropriate remedial action such as logging the discrepancy, notifying appropriate personnel using the Internet or wireless connections of the system, and/or activating appropriate audio and/or visible alarms.

Detailed Description Text (28):
The control computer then confirms that the individual requesting an object from the system is an authorized user that should have access to the requested item. If so, object retrieval continues. If not, the user is informed of the lack of authorization and the attempted access is logged for further investigation.

Security personnel also can be notified if desired. If the user is authorized, the lift assembly is activated to retrieve the container containing the requested object from its storage bin and deliver it to the platform of the digital scales. There, the identity of the container is verified using the RFID reader and the security container is weighed and its contents imaged as described in some detail above. The weight and object information extracted from the image is compared to weight and object information from the last check-in of the container. Both should be the same or should be what is expected under the circumstances. If there is a discrepancy, then the contents of the container may have been tampered with while the container was stored in the cabinet. For instance, the cabinet may have been opened with a stolen access key, or forcibly, by a would-be thief and the objects taken directly from the container while it was stored in its bin. Or, the entire container may have been taken, which is revealed if the RFID reader detects no container on the scale. In any event, a discrepancy indicates an alarm condition and appropriate personnel are notified of the suspected tampering.

Detailed Description Text (33):
In an enhanced embodiment, a single, larger RFID tag reader might be provided in the cabinet of the system. This RF tag reader may be programmed for continually monitoring and confirming that all security containers are still present inside the cabinet. In this way, if the system is compromised in some unforeseen way and any container is removed from the cabinet and thus from the RF tag reading zone, then the control computer notes the absence of the security container immediately and notifies appropriate personnel of the security breach. Appropriate alarms also may be sounded or set as required by the circumstances.

Detailed Description Text (40):
With the various elements and components of the embodiment of FIG. 9 described, a general discussion of applications and advantages will now be presented. One weakness of existing object tracking systems where objects are inserted into a portal in the system is that they rely on the small size of the outside entrance portal to prevent someone from reaching thru the portal in an attempt to tamper with the stored inventory. Because the entrance portal is small in these systems, the system is restricted only to storing small containers. To enable the secure storage of larger containers, a double door and antechamber arrangement as shown in FIG. 9 can be used. During container return, first the outer security door is opened and the inner security door is kept locked. After the object is detected by the control computer inside the antechamber, the outer security door is closed and then locked. Then the inner security door is unlocked, opened, and the object check-in procedure is continued. More specifically, in the embodiment of FIG. 9, the conveyor 106 is activated by the control computer to move the security container and its contents out of the antechamber and onto the scale to be weighed and digitally photographed. With such a system, larger containers requiring a large portal can be stored securely without risk that a would-be thief can reach through the portal and abscond with items stored in the system. The ability to secure larger containers greatly expands the number of markets to which the system is applicable.

Detailed Description Text (43):
The utility of the secured, storage system and methodology of this invention can be further enhanced by enabling mobile use. A mobile system will operate at least temporarily off of the internal battery backup system (FIG. 1) and have wheels or casters. The battery allows the system to maintain continuous secure operation while unplugged. Also, the mobile system will maintain communication using RF Ethernet technology such as the RF LAN communications device illustrated in FIG. 1. This wireless connectivity allows remote billing and security monitoring during mobile operations. One envisioned use for the mobile system is drug storage/dispensing in a hospital. Clearly, many other applications also may exist and all are within the scope of the present invention.

Detailed Description Text (47):
The invention has been described herein in terms of preferred embodiments and methodologies that represent the best mode known to the inventor of carrying out the invention. It will be understood by those of skill in the art, however, that many modifications and additions might be made to the illustrated embodiments within the bounds of the invention. For example, the object tracking and control method of this invention includes the steps of identification and verification of the actual objects being tracked. This is carried out in the preferred embodiment through two specific types of measurements; namely, weight and a digital image. However, other types of measurements might be selected and implemented by those of skill in the art, including, for instance, infrared, ultraviolet, or x-ray imaging, density measurements, sonar measurements, magnetic detection of ferrous objects, and the like. One specific alternate means for identifying and verifying the objects themselves that bears mentioning is to provide both the security containers and the objects in the containers, such as keys, with a readable identification code. A pair of code readers are then provided in the cabinet, one for reading the ID code associated with the security container and the other for reading the ID code on, in, or connected to objects contained within the container. In the preferred embodiment, the ID codes on both the container and object are stored in RFID tags read by RFID readers within the cabinet. However, the container or object or both may bear ID codes in a form other than an RFID tag such as, for instance, an optical bar code or contact memory device and appropriate readers may be provided as needed. In fact, a user can event write a code or other identification on the security container in handwriting and this can be imaged and translated through imagery and handwriting recognition algorithms. However, in the preferred embodiment with an RFID tag on the object , the object identification and verification processes are carried out through radio frequency detection of the identification code on the object itself rather than or in addition to through weight measurement or digital imagery. The ultimate goal to identify the actual objects in the containers and to verify that the identified objects are what they are expected to be is still met. It will be clear from the forgoing that the illustrated and preferred measurements herein are intended only as examples of how the identification and verification steps of the process might be carried out. They are not intended to be limiting and, indeed, any type of measurement from which object identification and/or verification can be derived is considered equivalent and within the scope of the present invention.

CLAIMS:

1. In an object tracking and control methodology wherein objects to be tracked are dispensed from a central location for use and returned at the central location after use and wherein the objects are stored, dispensed, and returned in a security container bearing a readable identification code, the improvement comprising the steps of: (a) reading the identification code of a security container upon return of objects therein and identifying the security container based on its identification code; (b) extracting information about the object contained within the security container; (c) identifying the object in the security container based upon the extracted information and verifying that the object in the security container is the object that is expected to be in the security container based on the extracted information; (d) taking appropriate remedial action if the object is determined in step (c) not to be the object that is expected to be in the security container; and (e) storing the security container and the object therein at the central location if the object is determined in step (c) to be the object that is expected to be in the security container.

2. The improvement of claim 1 and wherein identification codes on security containers are stored in an RFID tag and wherein step (a) comprises reading the identification code through radio frequency transmission.

20. An object tracking and control system as claimed in claim 15 and wherein the

objects are contained within respective security containers bearing readable identification codes and wherein said system further comprises means in said storage unit for reading the identification codes of security containers as objects are dispensed and returned in said security containers to identify each security container.

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L6: Entry 2 of 2 File: USPT Dec 16, 2003

DOCUMENT-IDENTIFIER: US 6664897 B2
TITLE: Method and system for livestock data collection and management

Abstract Text (1):
An efficient method and apparatus for livestock data collection and management is described to provide quality assurance source verification data and performance tracking for individual animals throughout the production cycle. Individual animal data is efficiently collected, transferred, and shared in a transactional, event-oriented, row-oriented structure with few columns without need for creating relational structures. The BeefLink.TM. software includes components for data collection and real-time data lookup components; share, switch, route, and interface components; extract, transform, and load components; and report and analyze data components. Embodiments include data acquisition from multiple RFID reader locations; a web-based information system for a beef marketing alliance; value-based procurement, and supply chain management.

Brief Summary Text (13):
After the stockman phase, the animals are typically sent to a feedlot where they are fed a high-energy diet for about 150 days. At the feedlot, the cattle are in a finishing stage, where the main objective is to add pounds quickly while keeping the animals healthy. The cattle will be finished when they reach a weight of approximately 1,100 to 1,200 pounds. The feedlot is interested in animal weight gain, animal health, the effectiveness of various feed ration formulations, the characteristics of the feed consumed by an animal, required waiting periods on shipping animals after drug treatments, and animal origin and history.

Brief Summary Text (17):
There is variability in individual animal production efficiency and in individual carcass quality characteristics such as weight, frame size, muscling, fat content, marbling, and feed efficiency. This variation is due to a combination of genetic factors and environmental factors such as health and drug treatments, nutrition, growth history, and environmental and management factors such as geography, weather, and animal husbandry. Many of the genetic and environmental factors can be controlled or managed to improve both quality and economic return on investment if accurate historical information were available throughout the production cycle.

Brief Summary Text (22):
Although electronic identification through radio frequency identification (RFID) tags or barcodes are used in some phases of the livestock production cycle, there is a need to provide a means for individual animal identification throughout the production cycle and to minimize the difficulty of data entry throughout the industry, by interfacing with identification technologies such as RFID, barcode, retina scan, iris scan, DNA, and visual identification.

Brief Summary Text (23):
RFID Readers

Brief Summary Text (24):

Several RFID readers are commercially available, typically from the transponder suppliers, including models from Destron/Fearing, Inc., Allflex USA, Inc., Avid Marketing, Inc., and Tag Tracker.TM. from InfoClip LLC.

Brief Summary Text (25):
The prior art includes RFID readers that can distinguish multiple types of RFID transponders as illustrated and described in U.S. Pat. No. 5,235,326, issued Aug. 10, 1993, "Multi-Mode Identification System" to Michael L. Beigel, Nathaniel Polish, and Robert E. Malm.

Brief Summary Text (29):
U.S. Pat. No. 5,315,505 issued to William C. Pratt on May 24, 1994 for a "Method and System for Providing Animal Health Histories and Tracking Inventory of Drugs" describes a method and system for providing improved drug treatment to selected animals in a retained group. A computer system is used to provide an operator with the health and drug treatment history of an animal. With this information and a diagnosis of the animal's health condition, a drug treatment is chosen. The diagnosis and treatment are entered into the computer system to update the animal's health and treatment history. An object of the present invention is to provide complete source verification and performance databases for all key livestock events.

Brief Summary Text (34):
With the addition of RFID transponders for each animal and "event/detail" transponders, the computer program product becomes part of a system such that an RFID reader may be used to read the transponders thereby facilitating automated entry of individual animal identification and automated entry of events and details associated with a particular animal. Events and event details may be aliased, and data entry simplified, such as through RFID, bar codes, function keys, memory buttons. With the addition of radio frequency wireless communications, the system becomes even more convenient and easy to use. The system also includes audio feedback to confirm receipt of data into the system and multiple interconnected databases to facilitate the transfer and maintenance of animal data. One result of this invention is that quality assurance source verification data for individual animals will be available throughout the production and processing cycle. This source verification will include the ability to implement HACCP plans. The source verification provides an opportunity for enhanced product value through improved quality assurance and food safety.

Drawing Description Text (5):
FIG. 3 is a schematic showing a wired connection between the RFID reader and a host computer.

Drawing Description Text (6):
FIG. 4 is a schematic showing a wireless radio frequency data communication (RFDC) connection between the RFID reader and a host computer.

Drawing Description Text (7):
FIG. 5 is a schematic showing a wireless radio frequency data communication (RFDC) connection to a base station transmitter/receiver located between the RFID reader and a host computer.

Drawing Description Text (11):
FIG. 9 is a schematic showing a wireless radio frequency data communication (RFDC) connection between the RFID reader and a host computer and additional livestock databases.

Drawing Description Text (12):
FIG. 10 is a schematic showing a cabled connection between the RFID reader and a data concentrator device and a wireless connection to a host computer and

additional livestock databases.

Drawing Description Text (13):
FIG. 11 is a schematic showing a wireless radio frequency data communication (RFDC) connection between multiple RFID readers and a data concentrator device and a wireless connection to a host computer and additional livestock databases.

Detailed Description Text (6):
Referring now to FIG. 5, an animal is uniquely identified by means of a radio frequency identification (RFID) ear tag 32 or other type of identifier such as bar code, iris or retinal, DNA, or visual identifier. The preferred identification is an RFID ear tag such as those provided by Y-Tex Corporation, SFK Technology, Destron/Fearing, Inc., Allflex USA, Inc, Avid Marketing, Inc. Alternately, the identification may be by means of an RFID implant, a rumen bolus, or a collar fitting on a neck or leg.

Detailed Description Text (7):
This RFID identification is typically applied at the first opportunity to pen and work the animals, such as at an initial immunization or branding. The identification typically remains with the animal until the time of its slaughter. The RFID identification, typically will have previously been applied to older breeding animals.

Detailed Description Text (8):
As the animal is typically restrained in a working chute, its identification may be determined by means of an RFID reader 30. This identification is accomplished by placing the reader near, typically within six inches, of an RFID ear tag or implant transponder. The rumen bolus has a greater range. The preferred reader is described in more detail in an alternative embodiment described below.

Detailed Description Text (17):
Referring now to FIG. 5, in this embodiment, a remote transmitter/receiver 53a is incorporated into each of one or more RFID readers, and is in two-way wireless communication 52c to a base station 50. Multiple readers can be used for a single base station; and the base station requires only one input port 10c to the computer 10. Other data input devices such as scales 54 and thermometers 55 communicate with the base station through a remote for each such input device. When a remote device is installed, the Base Station Unit detects its presence and assigns a device identification. This information is relayed to the Host PC via the cabled connection (USB, RS485 or RS232). The Host PC makes the software application association through Beeflink or through included InfoClip driver software. Two-way communication between the host and the remote permit configuration such as specifying the baud rate of a device once the remote is detected. Multiple channels permit a one-to-many relationship between the host computer and the remotes.

Detailed Description Text (18):
An improved RFID reader 53b includes a microprocessor which scrubs the data and assigns a unique device number to the data. The communication utilizes spread spectrum 2.4 gHz with frequency hopping. An internal dipole antenna on the reader has a range of up to about 0.5 miles from the base station. The transceiver inside the reader can be procured with a RF connector which would allow the use of another internal antenna which would increase the RFDC range. An optional external antenna has a range of over 20 miles (Note this antenna configuration requires FCC approval). The same type of transmitter/receiver and firmware can be used to transmit data from the other measurement devices. The base station preferably has both a USB port 50a and a RS485 port 50b, which allows applications requiring more than 3 meters of cabling between the base station's USB port and the host computer to use the RS485 port which has a range of about 1700 feet. At the computer, a RS485 to USB port converter 10b is provided in order to use the computer's USB port 10c.

Detailed Description Text (23):
BeefLink is comprised of hardware and software to permit the user to scan radio frequency identification (RFID) ear tags, implants, collars, or boli with radio frequency identification scan readers; to enter new animals; to look up information on existing animals; to input new events; and to run queries on the work done. One objective of the software is to display pertinent data on each animal and add new events to the record in the least intrusive manner. The new animal records and events recorded are uploaded and incorporated into a larger database. Communication with the distributed databases allows the user to receive downstream animal performance data at his own computer.

Detailed Description Text (45):
With the RFID reader cabled or wireless radio cabled to a communication port, the user is ready to start scanning animals.

Detailed Description Text (53):
If an animal loses its RFID tag the animal can be re-tagged, and an Action Tag with "RETAG" as the event can be used to replace the old tag references. The system can be used with visual ID tags and barcode tags, but RFID transponder ear tags are the preferred identification method.

Detailed Description Text (72):
FIG. 3 illustrates a simple embodiment of the BeefLink data collection software with an RFID reader 30, which was linked by cable 33 to a host computer 10. In this case, animal identification would be obtained from an RFID transponder 32, and Work Cards 31 where RFID event transponders are used to record events.

Detailed Description Text (78):
FIG. 4 illustrates a simple embodiment of the Beeflink data collection software with a radio frequency wireless connection 40 between the RFID reader 30 and the host computer 10. In this case, animal identification would be obtained from an RFID transponder 32, and Work Cards 31 with RFID event transponders are used to record events.

Detailed Description Text (84):
FIG. 9 illustrates this existing system or existing database communication in a wireless reader embodiment. The RFID reader 30 communicates through RFDC transmitter/receivers 36 and 71.

Detailed Description Text (90):
The data collection components typically include data collection hardware such as rfid readers, electronic scales, and ultrasound; Beeflink.TM. data collection software, real-time feedback components; and utilities to format the data according to desired third party software formats. When the user does not have a computer, a manual input system such as Cattle Card.TM. is used to collect the data, which is subsequently input into the BeefLink software.

Detailed Description Text (96):
FIG. 11 illustrates a wireless reader configuration where the data concentrator 50 receives data from multiple RFID readers indicated by readers 30 and 45. This type of configuration is desirable in larger operations where there may be more than one livestock working area at a given time. In this case, a larger antenna 63 may be necessary at the data concentrator, and it may be desirable to have a keyboard 261 and monitor 262 connected to the data concentrator.

Detailed Description Text (99):
Referring now to FIG. 12, in this embodiment the components of the data collection and management system include unique Radio Frequency Identification (RFID) transponders for each animal; a Work Card of RFID transponders to identify

livestock events, an RFID Reader that can identify the animal and event RFID transponders; a wireless RFDC communication between the reader and a base station; wired or wireless connections to a scale, a thermometer, an ultrasound measurement device, and an output device, a wireless RFDC communication between the data concentrator unit and the host computer, Beeflink.TM. Data Collection Software; and etl interfaces.

Detailed Description Text (100):
Radio Frequency Identification (RFID) Transponders

Detailed Description Text (101):
Although the data collection system can operate manually with visual animal identification, the preferred operation is with Radio Frequency Identification (RFID) transponders 32 in the form of electronic ear tags, implants, boli or neck or leg collars to provide unique identification for each animal. Although ear tags and implants are the most common devices, a bolus transponder has been used successfully as a tamper-proof means of identification of cattle. The bolus transponder has the potential capability of measuring temperature and pH within the animal. The RFID transponders contain a small antenna attached to an integrated circuit that stores a unique identification number. Unlike bar codes, RFID transponders do not require line-of-sight to be read, the transponder simply needs to come into the proximity of an RFID reader.

Detailed Description Text (102):
RFID Reader

Detailed Description Text (103):
The RFID reader 30 will typically be stationary reader at high volume at the packer or feedlot operations and portable readers at the processing points. Stationary readers will be typically be connected to a host computer by means of a cable, but a wireless connection may also be used for stationary readers. The portable readers will typically use a wireless connection to the computer. The Readers emit a low radio frequency, typically a 134.2 kHz signal that excites the passive transponder in the event or animal identification tag and the device responds at a second frequency. Once excited, the transponder responds back to the reader via radio frequency with a digital signal representing its unique identification. The reader decodes the signal, displays the identification, and sends the identification to the computer.

Detailed Description Text (105):
A Work Card 31 with RFID transponders 41, 42 and 43 provide livestock event identification so that events can be read by the RFID reader rather than entered by keyboard. The user may select one or more event cards for the anticipated work session. Other event tags may be affixed at other convenient locations in the work area, such as around the processing chute. The tags on the work card have the name or symbol label for the corresponding events so that the person working the cattle can quickly scan the appropriate event when it occurs.

Detailed Description Text (115):
In the preferred embodiment, the RFID tags, and visual identification tags are correlated so that at any point in the livestock cycle, historical data is available to any entity in the chain of title for the livestock.

Detailed Description Text (132):
Referring now to FIG. 18, the DeviceCore 330 includes SerialDeviceComponents 331 which interface with AgInfoPorts 554 to manage the connection to local or networked devices such as an RFID reader 30, scale 54, or ultrasound 56. The DeviceCore performs manipulation, and notification functions and allows AgInfoPorts 554 to send data to the IndividualAnimalManager 482 component and other third party components.

Detailed Description Text (172):
Referring now to FIG. 30, the AgInfoPort 554 component connects physical hardware, such as scales 54, thermometers 55, Ultrasound 56, RFID readers 30, bar code readers, and other monitoring devices to the device server 330. The component includes device settings 555 including logical device names and default settings for know devices; serial port settings 556 including user configurable port assignment and baud rate; serial port monitoring 557 to display data received through a specified port and logging of that data to a file; user configurable device communications 558 including data to configure the device and to trigger the device to send information; user configurable data filtering 559 for noise elimination, string matching, and data stripping; and data validation 560 to specify ranges or lists of values for filtered data and to create indicators of data stability. The component provides a graphical display showing COM port status, current data, and auditing information.

Detailed Description Text (221):
Referring now to FIG. 37, which is a flowchart demonstrating an example data collection for cattle, an animal RFID transponder is read using an RFID reader at step 2100. The unique animal code is parsed from the transponder identification from reader software at step 2200. The unique animal code is uploaded to the host computer at step 2300 and stored in the computer database at step 2400. At step 2500, the host computer confirms the receipt of the unique animal code, typically through headphones or a speaker in the vicinity of the reader. Default animal event data that is common to the animals is applied by the host computer at step 2550. Animal event data is input using an RFID Work Card and the RFID reader at step 2600. Measurement data, such as weight are captured through multiple input/output devices at step 2700 and uploaded to a host computer at step 2800. Data may be maintained on more than one database or on more than one computer. Measurement data receipt is confirmed at step 2900, typically through a speaker; and the animal data is then stored in the host computer database at step 3000. Authorization levels are assigned to the data at step 3100. The user may elect to display the history of the animal data at step 3200. The user may elect to input one or more queries on data associated with a particular animal at step 3300, and the data represented the results of the query are displayed at step 3400.

Detailed Description Text (230):
Referring now to FIG. 42, at step 6100 the user may select one or more hardware devices including multiple RFID readers, electronic scales, digital thermometers, and ultra sound equipment, as well as data buffering and monitoring devices. The user may configure the hardware device at step 6200 by selecting settings for communicating with the hardware device such as to initialize the device, to open or close the device, or to trigger the device to send information. User-configurable filters are applied to incoming data in order to eliminate noise or bad data caused by interference or device inaccuracies; to allow for substring matching that identifies acceptable input; to allow for capturing only specific data from the serial port; or to allow extraneous data such as prefixes, suffixes, or substrings to be stripped from final output. Data validation may be specified such that filtered data is has acceptable values, ranges, limits and timing. The data validation permits specification of a range or list of values for filtered data; and creation of "stable indicators", ensuring that incoming data conforms to the range of value, or is the same value, over a specified period of time. At step 6300, the user may select hardware properties by selecting the port number, baud rate, parity, stop bits and flow control at step 6800. Since there are a number of different device manufacturers, the user may set acceptable input criteria to ensure only accurate data strings are accepted.

Detailed Description Text (240):
For applications that are not able to connect to the computer program product in real time, a utility helps import data after collection. The data import can be

used to import a variety of data types into computer program product's database. It allows the user to add specific data like dates and entity identification codes while turning typical columnar data files into data that can be used with a transaction-style database. Imported data is modified such that it can be used with a transaction-type database.

Detailed Description Text (270):
In this embodiment, a producer who believes that he is supplying better than average quality animals contracts to sell those animals to a producer for a combination of (a) an average market price immediately; and (b) a share of any premium recognized by that animal upon its sale. As the majority of cattle are now sold on a value grid system, the feedlot can share risk and reward with the producer. The feedlot operator is able to acquire better animals at a lower initial price; and the producer is able to recognize more income from animals that do prove to have additional value to the packer. Individual animal identification and data collection provide historical data that the feedlot operator can evaluate in making a purchase decision; and continued data acquisition for the animal provides health, feed efficiency, and carcass merit information that may be used by the feedlot and the producer to better identify the performance of individual animals. Those animals that demonstrate more efficiency in weight gain, better health, and higher carcass grades provide better return to the feedlot. As those animals are sold, the producer is able recognize a portion of the premium over an average carcass. For instance, a producer sells an 750 pound calf to the feedlot at the then-current average market price of $85.00 per hundred weight. The feedlot feeds the animals for about 20 weeks. The animal is then sold on a grid system and its 750 pound carcass grades at the upper 2/3 of the Choice grade which represents a price of $1.25 per pound versus $1.17 per pound for average carcass. At this point, the carcass has a value that is $60.00 higher than an average carcass. The producer receives a premium of $30.00 due to the more efficient weight gain and the higher carcass value. The feeder has recognized additional profit of $30.00 without incurring the risk of having paid a higher price for the animal.

Detailed Description Text (276):
A traditional livestock lender typically will finance 70% of the value of a beef calve. The owner or operator is responsible for providing the other 30%. These values are based on historical practices and average cattle values and risk. This cost of financing can be lowered by providing the traditional lenders with a lower risk, and by providing tools that permit other lenders to provide funding. A lender can reduce risk by identifying and tracking individual animals, and by knowing those animals' history and performance. A risk-adjusted financing of 85-90% of a calf can reduce ownership costs by $50.00 to $120.00. The risk can be shared by performing market analysis throughout the production cycle. Generally, the animals will become more valuable over time, but the risk of market downturns and individual animal loss can be borne by the producer more economically by adjusting the "margin call" in these circumstances than by self financing the 30%.

Detailed Description Text (277):
Some of the lender risk is due to a very small number of producers misrepresenting their collateral. Individual animal identification permits a virtual national lien registry of individual animals so that they cannot fraudulently be used as collateral in multiple loans.

Detailed Description Text (283):
In this embodiment a hand held device such as the Pocket Tracker.TM. System, provided by InfoClip LLC, has an RFID reader and a small display screen, The device is used to read an animal or work card RFID transponder remote from a host computer. After data collection, typically from several animals the hand held device is synchronized with a host computer running the Beeflink program.

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L14: Entry 2 of 17 File: USPT Jun 22, 2004

DOCUMENT-IDENTIFIER: US 6752277 B1
TITLE: Product display system using radio frequency identification

Abstract Text (1):
A system for the display and distribution of multiple product items, where the product items bear radio frequency identification (RFID) tags, and an RFID reader is associated in close proximity for maintaining effectively continuous inventory control. A product display tray is provided with multiple product channels and individual pusher sleds in the product channels for urging the product items to the front of the display. The pusher sleds are actuated by non-metallic tension elements extending underneath the product items in conjunction with spring-actuated windup reels for maintaining the tension elements under tension urging the sleds in the desired direction. An RFID reader board is disposed directly under the product display tray, arranged for periodic reading of the entire contents of the tray. The non-metallic tension elements, extending underneath the product items, provide for actuation of the pusher sleds without interfering with the radio frequency identification procedures.

Brief Summary Text (2):
Radio frequency identification (RFID) is finding increasing application to inventory and point-of-purchase control for products that are mass merchandised. In large chain store systems, product suppliers typically are allotted a very specific shelf or wall area in individual stores of the chain. Typically, substantial sums of money are required to be paid by the suppliers for the allotment of such shelf or wall space for the display of the supplier's product. Because of the significant costs involved, and the limited space available, suppliers devote considerable time and effort to the design of the planograms for their product space, seeking to achieve maximum product sales from the display space provided. In many cases, the manufacturers visit the individual stores on a regular basis to review the state of their planogram, and make certain that merchandise is displayed where it is supposed to be displayed, and that there are adequate quantities of each product.

Brief Summary Text (3):
RFID procedures can be employed to advantage in managing and monitoring such product displays on a remote basis, minimizing the need for personal visitations by manufacturer's representatives. Using RFID systems, each product item can be provided with an individual identification tag, which is specific not only to the class of product, but even individual to each particular product item within the class. A radio frequency reader element is associated with the product display, and is activated periodically, for example as frequently as twice a minute. When the reader is in operation, the identification tag of each product item within range of the reader is activated and returns its unique identification code to the reader, which can then transmit the information to any of various remote locations, enabling the supplier to know on a substantially continuous basis which product items are selling and the rate of such sales. Additionally, the RFID information transmitted can also indicate when a particular product item has been misplaced in the planogram, as frequently occurs when a prospective customer picks up an item for inspection and replaces it in a different location. The technology for such RFID inventory management systems is well known to those in the art.

Drawing Description Text (11):
FIG. 10 is an exploded view illustrating the display tray of FIG. 1 in conjunction with RFID reader components associated therewith.

Drawing Description Text (12):
FIG. 11 is a bottom perspective view of one of the product items of FIG. 1, illustrating an RFID identification tag associated therewith.

Detailed Description Text (4):
In the system of the invention, the tray 20 is associated with an RFID reader board 26 (FIG. 10), which is mounted on a support panel 27 and provided with a plastic cover 28. The support 27, plastic cover 28 and RFID reader board 26 form a subassembly which is attached to the bottom of the display tray 20, so as to place the reader board 26 in close proximity to the bottom wall 29 of the tray (see FIG. 2).

Detailed Description Text (5):
The RFID reader board 26 is based upon known technology and does not per se form part of this invention. By way of example only, the Doty U.S. Pat. No. 5,591,951 illustrates a type of RFID system for reading encoded information embedded in an identification tag attached to items of merchandise. Systems of this nature are well known and used for a number of purposes. Individual identification tags 30 (FIG. 11), are affixed to each product item 21. The identification tags incorporate circuitry that is activated by radio frequency signals generated by the reader board 26. In response to such activation, the identification tag transmits an identifying signal that is specific to the information embedded in the tag, which signal is received and processed by the reader board, all in accordance with generally known technology. It is within the contemplation of this invention that each product package will be provided with a unique identification tag 30 such that even identical product items, which might bear the same bar code identification, for example, will carry unique identifying information on the RFID tag 30, such that the individual product items can be identified. By means not illustrated herein, but well known in the art, the information read by the reader board 26 can be transmitted to one or more remote locations for processing, such that the exact state of the merchandised carried by the tray 20 can be determined at any time. In the illustrated system, it is contemplated that the reader board 26 will scan the entire tray at, for example, 30 second intervals, so that real time inventory conditions are available to the merchandiser.

Detailed Description Text (18):
In the operation of the system of the invention, the display tray 20, shown in FIG. 1, is loaded with product items in the individual channels 23, with each channel having a pusher sled 25 bearing upon the rearmost item 21, urging the entire column forward. The RFID reader board 26, which is located directly underneath the tray 20, is activated periodically to read successively the individual columns of product items and report the identity of each individual item present. This enables the merchandiser to ascertain which items are selling and at what rate. Moreover, since each item is individually identified, the data feedback can indicate whether a given item is placed in the wrong column, so that the matter can be quickly corrected.

Detailed Description Text (19):
The non-metallic tension element 43, which is interposed between the bottoms of the product items 21 and the reader board 26 positioned immediately below, does not in any way interfere with the transfer of information to the RFID reader. Although the windup reels 41 are driven by metallic springs 53, these springs are positioned entirely behind the column of product items, and thus cannot interfere with accurate readings of product information.

CLAIMS:

1. A system for the display and distribution of multiple product items, wherein the product items bear RFID identification tags, which comprises (a) a display rack comprising a bottom and confining side structure forming a display track for the presentation of a row of product items supported by said bottom, (b) a pusher sled supported for movement in forward and rearward directions within said display track and having a front wall for engagement with a rearmost product item of a row thereof within said display track, (c) a non-metallic tension element engaging said pusher sled for urging said pusher sled forwardly on said display track to advance product items presented therein, (f) an RFID reader positioned in close relation to said display track for actuating identification tags on product items supported by said display track and reading information obtained therefrom.

2. A system according to claim 1, wherein (a) said RFID identification tags are carried on bottoms of said product items, and (b) said non-metallic tension element extends along said display track underneath said identification tags.

7. A system according to claim 1, wherein (a) said RFID reader is positioned directly below said display track for reading product items supported on said display track.

8. A system according to claim 1, wherein (a) said display rack comprises a plurality of sets of confining side structures forming a plurality of side-by-side display tracks, (b) each of said display tracks is provided with a pusher sled actuated by a non-metallic tension member extending forwardly therefrom along the respective display track in which said pusher sled is located, and (c) said RFID reader comprises a reader board positioned directly underneath said display rack for reading identification tags on product items in each of the display tracks thereof.

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L14: Entry 4 of 17 File: USPT Apr 20, 2004

DOCUMENT-IDENTIFIER: US 6724309 B2
TITLE: Method and apparatus for tracking carcasses

Brief Summary Text (10):
One embodiment of the present invention is an apparatus for identifying a carcass during meat production. In this embodiment, the apparatus may comprise a band sized to fit around a limb of the carcass and a readable identification tag coupled to the band for remote identification of the carcass. In one embodiment, the readable identification tag may be a radio-frequency identification ("RFID") tag or a bar code identification. In another embodiment, the apparatus may comprise a band sized to fit around a gambrel used to support the carcass, and a readable identification tag coupled to the band for remote identification of the carcass.

Brief Summary Text (11):
Another embodiment of the invention is an apparatus for identifying a carcass during meat production, wherein the apparatus comprises a plastic strip formed into a ring sized to fit around a limb of the carcass, and an RFID tag coupled to the plastic strip for remote identification of the carcass. Another embodiment of the present invention is a block adapted to removeably engage the trolley, and an RFID tag coupled to or embedded in the block for remote identification of the carcass.

Brief Summary Text (12):
Another embodiment of the invention is a method for identifying a carcass during meat production. In this embodiment, the method comprises placing a band around a limb of the carcass, wherein the band includes an RFID tag, and reading identification information from the RFID tag with an RFID tag reader. In another embodiment, the method includes attaching a block, which includes an RFID tag, to a trolley, and reading or writing identification information from the RFID tag with a read/write device.

Brief Summary Text (13):
Another embodiment of the present invention is a method for reusing an RFID tag. In this embodiment, the method includes clearing any writable memory on the RFID tag and verifying that the tag remains operational prior to placing the tag on the next carcass in the production line. Another embodiment of the present invention is a method of tracking carcass information using an RFID tag. In this embodiment, the method includes storing predetermined critical information in the memory located in the RFID tag.

Drawing Description Text (9):
FIG. 8 is a perspective view of a block, including an RFID tag, coupled to a trolley, according to a fifth embodiment of the present invention.

Detailed Description Text (2):
In general, as shown in FIGS. 1-3, one embodiment of the present invention includes a band 10 with a readable identification tag attached. The readable identification tag may be a radio frequency identification ("RFID") tag 12, a bar code identification 22, a combination of an RFID tag 12 and a bar code identification 22, or some other identification device as is commonly used by those skilled in the art. In one embodiment, the RFID tag 12 is permanently attached to the band 10. In

another embodiment, the RFID tag 12 is removeably attached to the band 10. The RFID tag 12 is also known as an electronic label, a transponder, or a code plate.

Detailed Description Text (3):
The band 10 may be placed over a limb or other portion of a carcass or over a gambrel attached to the carcass during meat processing, and the carcass may then be identified or tracked during meat processing through reading of the RFID tag 12 or bar code identification 22 with one or more RFID tag readers, scanners, or bar code readers. The term "band" is intended to mean and encompass a generally ring-like oval or annular structure or a collar of any other geometry, whether generally rigid or flexible and whether continuous, substantially continuous, or comprising a length of material with two ends adapted to be coupled together. Throughout this specification, the term "carcass" will be used to refer to the corpse of a slaughtered animal, and may include a whole corpse of the animal or a side of the animal that results from splitting a whole carcass into two sides.

Detailed Description Text (12):
Although any of the bands 10 described above may be used for commercial hog production and may be placed over the limb of the hog carcass 60 for use, in other embodiments, a band 10 sized to fit the gambrel 100 may be used. FIG. 7 depicts one embodiment of a band 10 sized to fit over a gambrel 100, and such a band 10 may be suitable for use during commercial hog production. The band 10 depicted in FIG. 7 may be made from any of the materials described above. In one embodiment, the band 10 is made from a material that can withstand high temperatures (such as phenolic), which are frequently experienced during commercial hog production, such as when hair is singed from the hog carcass 60. The band 10 depicted in FIG. 7 has a thickness t between an inside edge 112 and an outside edge 114 of the band 10. The band 10 of FIG. 7 may have any or all of the features described above, including an RFID tag 12 and a bar code identification 22.

Detailed Description Text (13):
FIG. 8 shows another embodiment of the present invention. In this embodiment a block 120, which contains an RFID tag, engages a trolley 122. As shown, the trolley 122 includes a frame 124, a roller 126 and a hook 128. The roller 126 is coupled to the frame 124 using an axle 130. As shown in FIG. 8, the block 120 engages the frame 124 and includes an opening adapted to accept the an end of the axle 130. FIG. 9 shows a perspective view of the block 120. As shown in FIG. 9, the block 120 includes a housing 132 and an RFID tag 12. The housing has a trolley notch 134 and an opening 136. In the embodiment shown in FIG. 9, both the trolley notch 134 and the opening 136 are disposed closer to a first end than to a second end of the housing 132. This design leaves sufficient room at the second end for embedding the RFID tag 12. As shown, the opening 136 is generally centered along a lateral dimension of the housing 132 and is adapted to accept the axle 130 of the trolley 122, as shown in FIG. 9. The trolley notch 134 has a width (shown as "w" in FIG. 9) approximately equal to a width of the trolley 122. The trolley width will vary depending on the manufacturer of the trolley and the species of animal it is intended to support.

Detailed Description Text (15):
In another embodiment of the present invention, the opening 136 is located at the approximate center of the block 120, and the housing 132 is adapted to accept a second RFID tag 12. In one embodiment, the housing 132 does not have an opening. In one embodiment the fingers 140a, 140 extend completely across the lateral dimension of the housing 132. In another embodiment, the fingers 140a, 140b extend only partially across the lateral dimension. In one embodiment, the housing 132 is formed or molded around the RFID tag 12. In another embodiment, the housing 132 includes a pocket sized to accept and secure the RFID tag 12.

Detailed Description Text (16):
In the embodiments of the invention containing an RFID tag 12, the RFID tag 12 may

be coupled to the band 10 or block 120 and used for remote identification of the carcass 60. The RFID tag 12 may be of any variety known to those skilled in the art, and is sized such that it may be embedded in the band 10 or block 120 without protruding significantly. The RFID tag 12 may be affixed to the band 10 or block 120 in any manner known to those skilled in the art, such as through the use of adhesives, pins, or embedding technology.

Detailed Description Text (17):
RFID tags known in the art can generally be placed into two categories, based on the method of powering the tags. The first type of RFID tag is a passive tag, and the second type is an active tag. Passive tags do not include a built-in power source, but instead draw energy from an external electromagnetic field using a coil. Active tags include an on-board energy source. Either type of RFID tag may be used with the present invention. RFID tags know in the art can also be placed into two categories, based on the reading and writing capabilities of the tag. The first type of RFID is a read-only tag. This type of tag generally contains a preset identification number and cannot store any additional information. The second type of RFID tag is a read-write tag. A read-write tag generally contains a preset identification number, but also includes some writable memory. RFID tags can also be placed into various categories, based on operating frequencies. For example, ear tags used in live animal tracking are typically in the range of 125 kilohertz, which is good for tracking non-metal objects. RFID tags currently extend up to 2.45 gigahertz. In general, the higher the frequency, the shorter the antenna required, and therefore the smaller the package required for the tag. In one embodiment, frequencies of 13.56 megahertz and 2.45 gigahertz both function adequately for purposes of the present invention, but most other frequencies can also be made to work effectively.

Detailed Description Text (18):
Although any type of RFID tag 12 may be used, in one embodiment a foil RFID tag, as is commonly used in embedding applications, may be used as the RFID tag 12 in the invention. One suitable RFID tag 12 may be a tag-it inlay made by Texas Instruments. Another suitable RFID tag 12 may be a coil RFID tag made by Texas Instruments. The RFID tag 12 may be used to store any information relating to the carcass 60, such as the carcass weight, the type of animal, the time of slaughter, and the identification number for the carcass 60. An RFID tag 12 is a type of data collection technology that uses an electronic tag to store identification data, and a wireless transmission method that may be used for data capture from the electronic tag. If the RFID tag 12 is a passive tag, it may get its power from the RFID tag reader or scanner that is used to read the data on the RFID tag 12.

Detailed Description Text (19):
In one embodiment of the present invention, the RFID tag 12 is a read-only tag. In this embodiment, the identification number contained in the RFID tag 12 is read at various locations along the meat processing line where additional information relating to the carcass is gathered. The information and identification number are then transmitted to a computer system for storage, as explained in greater detail below. In another embodiment, the RFID tag 12 is a read-write tag. Read-write tags that will work with the present invention include IntelliTag.RTM. Series from Intermec Technologies Corporation and the HMS-100 Series passive read-write tags available from Escort Memory Systems. In this embodiment, the information gathered is transmitted to the computer system for storage and, additionally, some key information is stored in the memory located on the RFID tag 12, as explained in more detail below. Storage of a portion of the information directly on the RFID tag 12 facilitates compliance with USDA requirements that certain critical information be present on the carcass.

Detailed Description Text (20):
In one embodiment of the invention, the band 10 or block 120 may contain a bar code identification 22 that may be read by a bar code reader (as may be seen in FIG. 5).

The bar code identification 22 may be any type of bar code commonly used by those skilled in the art, including one-dimensional bar codes and two-dimensional bar codes. A bar code is a pattern of bars of various widths and with varying spaces that may be printed on paper or other suitable material for recognition by a bar code scanner or bar code reader. The bar code scanner or bar code reader uses a laser beam or light source and a photocell, which reads the light reflected from the bar code. Any type of bar code and bar code scanner may be used which is known to those skilled in the art. Such bar code scanners commonly may be placed within close proximity to the bar code identification 22 to read the information from the bar code identification. An RFID tag 12, on the other hand, may typically be read from a greater distance than a bar code identification 22. Bar code 128 is one possible type of bar code that may be used within the scope of the invention, and such a bar code could be read using a Symbol Model P360 bar code reader.

Detailed Description Text (21):
In addition to the RFID tag 12, the band 10 or block 120 may also contain a variety of other components. In one embodiment, the band 10 or block 120 contains a visible number 14, as shown in FIGS. 1-3. This visible number 14 may be used for a simple visual identification of a carcass 60 by workers in the meat production facility. The band 10 or block 120 may also contain one or more sensors that may be used during the meat production process. In one embodiment, for instance, the band 10 or block 120 contains a temperature sensor 16, which may be attached or embedded in the band 10 or block 120 and which may be a wireless temperature sensor. In other embodiments, the band 10 or block 120 contains a sensor 18 that may be used for the detection of an ambient condition adjacent the carcass 60, such as humidity. Such an ambient condition sensor 18 may also be embedded in the band 10 or block 120 much like the temperature sensor 16 or the RFID tag 12. In another embodiment, bio-sensors and air quality sensors are affixed to the band 10 or block 120.

Detailed Description Text (23):
As discussed previously, FIG. 5 depicts a carcass 60 hanging from a shackle or a trolley 64 riding along a meat processing line 66. A band 10 of one embodiment of the invention has been placed over a hind leg 62 of the carcass 60, although this band 10 could also be placed over a gambrel or other support used for suspension of the carcass 60. Positioned along the meat processing line 66 is an RFID tag reader 68. As noted above, any type of RFID tag reader 68 may be used within the scope of the invention. The RFID tag reader 68 may read information from the RFID tag 12 on the band 10 from a suitable distance depending on the type of RFID tag 12 and RFID tag reader 68 used, as depicted in FIG. 5. A bar code scanner or reader 70 may also be positioned along the meat processing line 66. Such a bar code scanner 70 may be used to read the information from the bar code identification 22 on the band 10. As depicted in FIG. 5, the bar code scanner 70 may be placed within a proximate distance of the band 10 to read information from the bar code identification 22 on the band 10. In other embodiments, a hand-held bar code scanner 70 is used to read the information from the bar code identification 22. The bar code scanner 70 may be any type of bar code scanner used by those skilled in the art.

Detailed Description Text (24):
In one embodiment, information read using the RFID tag reader 68 or the bar code scanner 70 is stored in a database and processor 75. The database and processor 75 may be any type of computer or computer system known to those skilled in the art, and it may save identification and tracking information for the carcasses 60 moving along the meat processing line 66. The RFID tag reader 68 or the bar code scanner 70, or both, may be connected to the database and processor 75 by any type of connection known to those skilled in the art, including a wireless network or a direct connection. In addition, a server 77 or other computer system, which may be a corporate computer system, may be integrated with the database and processor 75 such that all of the information relating to the carcasses 60 may be stored collectively for analysis. The server 77 may be any type of computer system, and the server 77 may be located off site or within the slaughterhouse facility. In one

embodiment, one or more of the RFID tag reader 68, the bar code scanner 70, the database and processor 75 and the server 77 are used with the block 120 coupled to the trolley 122 (which supports a carcass 60), as shown in FIG. 8.

Detailed Description Text (25):
In a method of the invention using an embodiment of the band 10, the band 10 may be placed around a limb of a carcass 60. As noted above, the band 10 may be placed over the limb of the carcass 60 either before or after the carcass 60 has been attached to a shackle 64. In the embodiment of the present invention using the block 120, the block 120 is pressed onto the trolley 122, either before or after the carcass has been attached. As the carcass 60 moves along the meat processing line 66, the RFID tag reader 68 may read the information from the RFID tag 12 on the band 10 or block 120. If a read-write tag is used, data collected at each reading station may also be written to the RFID tag 12 for storage. Such information may include the carcass weight, ambient conditions, an ear tag number, source and lot information, grade information, and inspection data. In one embodiment, the information stored directly on the RFID tag 12 includes the weight of the carcass and the carcass number. In another embodiment, the information stored directly on the RFID tag 12 further includes the ear-tag number. The carcass weight and ear-tag number are discussed in further detail below. The storage of this information directly on the RFID tag 12 removes the need for a printed carcass tag containing this information. Printed carcass tags in the prior art lack the durability of the RFID tag and also have a tendency to detach from the carcass 60. Storing this information on the RFID tag 12, therefore, provides a significant advantage over the use of a printed carcass tag.

Detailed Description Text (26):
FIGS. 10 and 11 depict locations throughout a slaughterhouse at which carcass information may be processed. Certain standards, such as those set by the Canadian Cattle ID Agency, may mandate that carcasses be identified and tracked up to a certain point (typically inspection) in a slaughterhouse. Typically, cattle or other animals have ear tags, which may contain RFID tags or bar codes in some embodiments, attached at the time of slaughter. The ear tags may contain information such as the producer of the animal, the animal's age, sex, and type of animal. Referring now to FIG. 10, when an animal arrives at the slaughterhouse facility (numeral 150), an initial ear tag data collection point 152 can be used to collect information about the animal, such as its age, sex, and producer, from the animal's ear tag 154. The animal is then commonly weighed (numeral 156) and weight information is collected and collated with the ear tag 154 for the animal, at the second data collection point 158. In one embodiment, a display screen 160 is used to display information about the animal to an operator.

Detailed Description Text (27):
The animals are then collected in pens (block 162), before stunning (numeral 164). After stunning (numeral 164), the animal is attached to a trolley or gambrel and the band 10 or block 120, is secured to the limb of the animal or to the gambrel or trolley, and the ear tag number or identification is matched up with the specific band 10 or block 120 used for that animal. In one embodiment a single band 10 or block 120 is used at this point, and in another embodiment, two bands 10 or blocks 120 are used, one for each leg of the animal. In one embodiment, a separate shackle tag is used at this point. In one embodiment, an ear tag 154 with an RFID tag is scanned with an RFID reader and that information is then written to the band 10 or block 120, which may contain an RFID tag. In one embodiment, using a read-only RFID tag, the information from the ear tag 154 is associated with the RFID tag number and stored in a separate database.

Detailed Description Text (28):
In one embodiment, after bleeding 166, the weight of the animal is read a second time (numeral 168), and information related to the weight is collected (block 170) and collated with the ear tag 154 and with the band 10 or block 120 used for the

animal. This information is then stored either on the RFID tag or in a separate database. The animal is then subjected to a skinning operation 172, and the first leg of the animal is typically hung from a trolley (numeral 173). In one embodiment, a band 10 or block 120 is applied to a first leg or first trolley at this point. In one embodiment, information related to the animal is read from a shackle reader (numeral 174), after skinning of the animal. In one embodiment, this information is then collected (block 175) and collated with the ear tag 154 and with the RFID tag, for storage. This data collection step is necessary only if some needed information has been previously stored using a shackle tag. Next, the second leg of the animal is typically hung from a trolley (numeral 176). In one embodiment, at this point a second band 10 or block 120 is added to the second leg or to the second trolley.

Detailed Description Text (29):
In one embodiment, lot information and CCS information for the animal is then collected (block 178). In one embodiment, this data collection station includes two RFID tag readers 180 and 182 (one for each leg of the animal) and an ear tag reader 184. In one embodiment, this data collection point also includes an ultrasound device 186 for taking measurements relating to the meat content of the carcass. In another embodiment, this data collection point further includes an input/output device 188 to allow an operator to manually enter data for storage and to provide a visual display of information to the operator.

Detailed Description Text (30):
At some point along the meat processing line, final skinning is performed (numeral 190), and the head of the animal is removed, so information from the ear tag 154 is finally collated with the band 10 or block 120, at this data collection point (block 178). Ear tags 154 and bands 10 or block 120 may be matched manually or automatically with RFID tags or bar codes, as explained above.

Detailed Description Text (31):
In one embodiment, information related to the inspection of the animal, which could include health information and cleanliness information, is written to the band 10 or block 120 or stored on the database and processor 75 in association with the RFID tag number, at another data collection point (block 192) along the meat processing line. In one embodiment, this data collection point includes an input/output device 194 for displaying information regarding the carcass to the operator and for allowing the operator to manually enter information for storage. The animal is then typically subjected to splitting (numeral 196) and trimming (numeral 198). After the animal has been dressed, in one embodiment, each side of the carcass of the animal is weighed, and this weight information is written to (or associated with) the band 10 or block 120 at another data collection point (block 200). In one embodiment, this data collection point includes an input/output device 202 for displaying information regarding the carcass to the operator and for allowing the operator to manually enter information for storage. In addition, information related to trimming or cutting performed on the carcass to clean or prepare it may also be written to the band 10 or block 120 through manual or electronic methods. In one embodiment, a handheld reader 204 is used to read or write data to the band 10 or block 120, for a carcass side, prior to steam pasteurization.

Detailed Description Text (34):
At each of the stations described above, with reference to FIGS. 10 and 11, the data or information collected is either stored directly on the tag (if the RFID tag 12 is a read-write tag) or on the database and processor 75 (shown in FIG. 5) in association with the RFID tag identification number. In one embodiment, some of the information collected is stored directly on the read-write RFID tag 12, and all of the information collected is stored on the database and processor 75.

Detailed Description Text (35):

The RFID tags 12 are removed from the carcass 60 in the boning room (block 218). In one embodiment of the present invention, as discussed above, the band 10 or block 120 and the RFID tag 12 are adapted to be reusable. In this embodiment, the removed RFID tags 12 are returned to the application location in the meat processing line (numerals 173 and 176 in FIG. 10) for attachment to the next carcass 60. Prior to attachment to the carcass 60, any information stored directly on the RFID tag 12 (in the case of a read-write tag) is erased. In one embodiment, prior to placing the RFID tag 12 on the carcass 60, it is read to verify that it remains operational. If the RFID tag 12 is operational it is attached to the carcass 60, otherwise it is discarded.

Detailed Description Text (37):
Another advantage of one embodiment of the band 10 of the invention is that the RFID tag 12 will not become obscured with material as may occur with a vision-based system. The band 10 of the invention, therefore, may be more reliable and may require less maintenance than a vision-based system. The band 10 of the invention may be used during commercial meat production in which carcasses 60 typically move along a single chain or line at a rate of 300 to 600 head per hour. The bands 10, therefore, may be quickly and easily placed over a limb of a carcass 60 at the speed of the meat processing line 66. In an embodiment of the band 10 having a frusto-conical shape, the band 10 may accommodate various animals and limbs of different proportions and may also be self-tightening or shaped to securely and smoothly fit on a limb of the carcass 60. Yet another advantage, in an embodiment of the band 10 which is made from a non-metallic or plastic material, is that the RFID tag 12 may be more easily read than if a metal background to an RFID tag 12 is used. For instance, if an RFID tag is attached to a metal trolley, it may be more difficult to read the RFID tag than if a plastic or non-metallic background to the RFID tag is used.

CLAIMS:

2. The device of claim 1 wherein the readable identification tag is an RFID tag.

3. The device of claim 2 further including a second RFID tag coupled to the block.

4. The device of claim 2 wherein one of the arms includes a compartment for housing the RFID tag.

5. The device of claim 2 wherein the RFID tag is a passive RFID tag.

6. The device of claim 5 wherein the passive RFID tag includes an identification number.

7. The device of claim 2 wherein the RFID tag is an active RFID tag adapted for storing information.

8. The device of claim 7 wherein the RFID tag operates at a frequency of about 13.56 megahertz.

9. The device of claim 7 wherein the RFID tag operates at a frequency of about 2.45 gigahertz.

10. The device of claim 1 wherein the RFID tag is embedded in the block.

20. A device for tracking a carcass hanging from a trolley, during meat production along a meat processing line, the device comprising a block adapted to couple to a frame of the trolley, the block including a housing and two generally parallel arms defining a trolley notch adapted to couple to the frame, and an RFID tag coupled to the block.

24. The device of claim 23 wherein the RFID tag is embedded within the housing near the second end.

31. The device of claim 20 wherein the RFID tag is a passive RFID tag.

32. The device of claim 20 wherein the RFID tag is an active RFID tag adapted for storing information.

33. The device of claim 32 wherein the RFID tag operates at a frequency of about 13.56 megahertz.

34. The device of claim 32 wherein the RFID tag operates at a frequency of about 2.45 gigahertz.

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